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UNCLASSIFIED

E. GEOLOGICAL SURVEY.

REPORTS OF THE
DEPARTMENT OF CONSERVATION AND DEVELOPMENT
STATE OF NEW JERSEY

ANNUAL REPORT

For the Year Ending October 31,
1917

Department of Conservation and Development

SUCCEEDING
THE GEOLOGICAL SURVEY
THE FOREST PARK RESERVATION COMMISSION
THE STATE MUSEUM COMMISSION
THE STATE WATER-SUPPLY COMMISSION
THE WASHINGTON CROSSING PARK COMMISSION
THE FORT NONSENSE PARK COMMISSION

Union Hill, N. J.
HUDSON PRINTING COMPANY
1918

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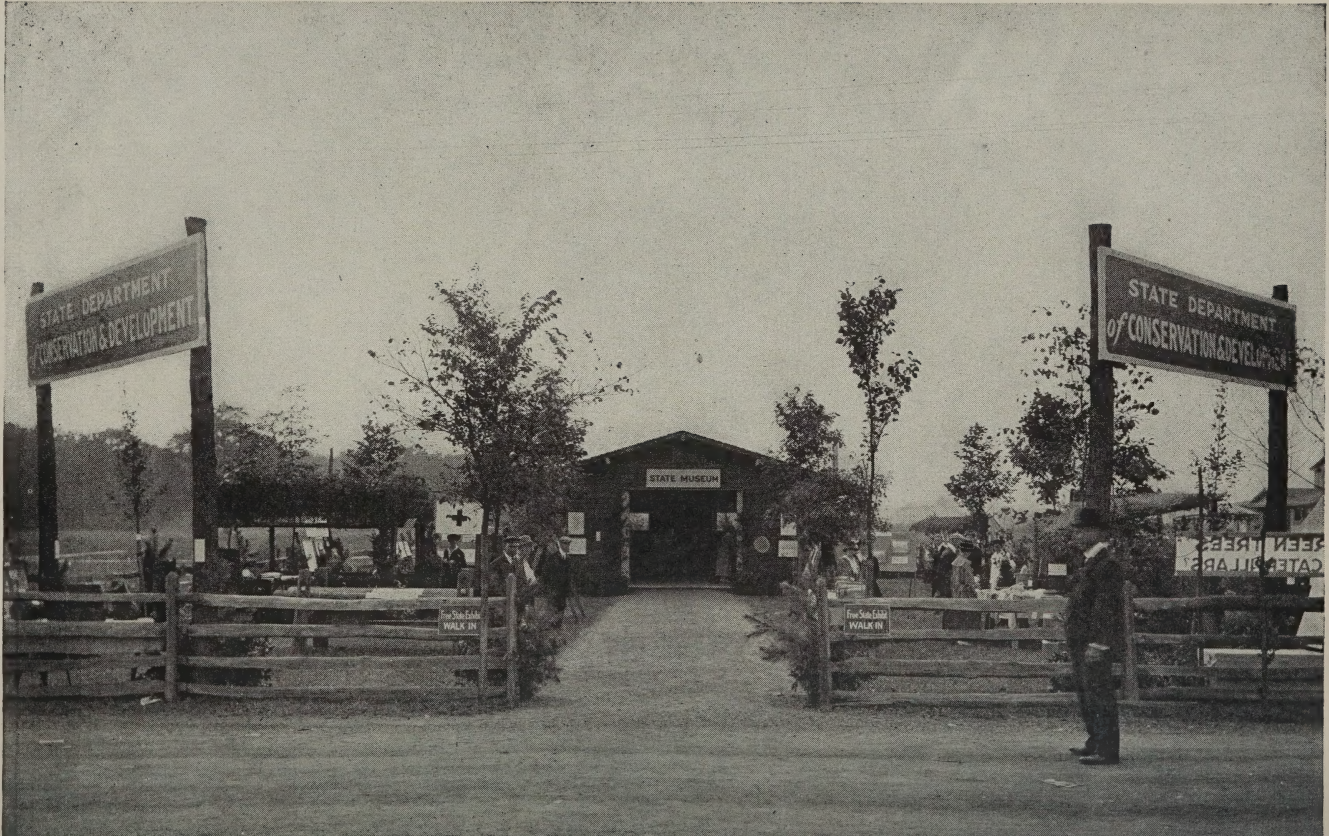

Fig. 1. DEPARTMENT EXHIBIT AT TRENTON INTERSTATE FAIR, 1917. (Frontispiece)

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The Department of Conservation and Development.

OFFICE, STATE HOUSE ANNEX, TRENTON.

The Board of Conservation and Development.

SIMON P. NORTHRUP, *President,*	Newark
PERCIVAL CHRYSTIE,	High Bridge
NELSON B. GASKILL,	Trenton
CHARLES LATHROP PACK,	Lakewood
STEPHEN PFEIL,	Camden
EDWARD S. SAVAGE,	Rahway
GEORGE A. STEELE,	Eatontown
HENRY CROFUT WHITE,	North Plainfield

ALFRED GASKILL, Princeton,	*State Forester and Director*
HENRY B. KÜMMEL, Trenton,	*State Geologist*
CHARLES P. WILBER, New Brunswick,	*State Firewarden*
M. W. TWITCHELL, Trenton,	*Assistant State Geologist*
H. T. CRITCHLOW, Trenton,	*Water Engineer*
C. C. VERMEULE, New York City,	*Consulting Engineer*
J. VOLNEY LEWIS, New Brunswick,	*Consulting Geologist*
W. M. BAKER, Trenton,	*Assistant Forester*
HELEN C. PERRY, Trenton,	*Museum Organizer*
R. B. GAGE, Trenton,	*Chemist*
C. C. ENGLE, New Brunswick,	*Soil Classifier*
WM. LINDSAY, Trenton,	*Division Firewarden*
JOS. E. ABBOTT, Vineland	*Division Firewarden*
F. C. TORREY, Lakehurst,	*Division Firewarden*
R. E. THOMPSON, Morristown,	*Division Firewarden*

8405

Letter of Transmittal.

To His Excellency, Walter E. Edge, Governor:

Sir—I have the honor to submit for your information, and for transmittal to the Legislature as required by law, the annual report of the Department of Conservation and Development for the fiscal year ending October 31, 1917. It includes reports by the Board, the State Geologist, the State Forester, the State Firewarden, the State Museum Organizer, and special reports on Washington Crossing Park and Undeveloped Lands.

By direction of the Board of Conservation and Development.

Very respectfully yours,
ALFRED GASKILL,
Director.

State House, November 28, 1917.

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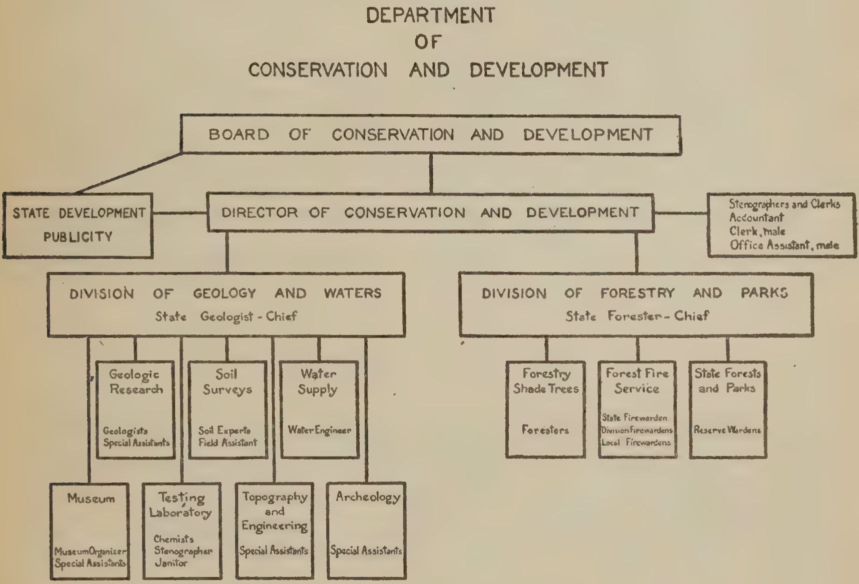
Report of the Board of Conservation and Development.

The Department as organized last year is working effectively. Unfortunately, a printer's error caused the wrong chart to be published on page 7 of the 1916 report. The following diagram shows the wide range of interests over which direction is exercised.



Late in July the offices of the Department were removed from the State House to a nearby dwelling, No. 121 West State Street. The resulting inconvenience, especially in separating the administrative offices from the State Museum, but emphasizes the need of an enlarged State House.

On March 14 the President of the Board resigned his membership that his time and energies might be devoted to a work in which he is greatly interested. At the meeting on March 30 the following was adopted and Mr. Nelson B. Gaskill elected President for the balance of the current term.

Resolved, That this Board having enjoyed the privilege of association with Mr. Walter J. Buzby as a member and presiding officer thereof, and realizing his deep interest in the work, plans and ideals of this Department, the value of his service and the loss which will be suffered by his severance, learns of his resignation with concern and regret, and

Resolved further, That we note with pleasure and satisfaction the continuance of Mr. Buzby's usefulness to the State as a member of the State Highway Commission.

At the meeting on July 9, Mr. Simon P. Northrup was elected President for the year.

Tho many opportunities to develop profitable lines of work have opened up, lack of money has made it quite impossible to do much more than maintain the activities of the established branches. The Board is obliged to study economy always, and needs but to refer to the fact that the appropriations made for maintenance in 1915 to the Boards and Commissions now merged in this Department aggregated $79,200, whereas the total maintenance appropriation for the current year is $66,700.

AUXILIARY COMMITTEE.

On February 26, Governor Edge, accepting the recommendation of the Board, appointed an Auxiliary Committee to aid in carrying out a program of State Development. The following gentlemen accepted the invitation and the majority attended a preliminary conference held at the Old Barracks, Trenton, on March 30; but the immediate outbreak of the war seemed to require that all plans for the future be held in abeyance until the emergency shall have passed. The Board believes that this Auxiliary Committee can be of great benefit to the State in helping to devise and execute plans by which our many and great resources shall be fully developed.

AUXILIARY COMMITTEE.

F. Wayland Ayer,	406 Penn St., Camden.
Col. John W. Aymar,	606 Eighth Ave., Asbury Park.
W. G. Besler,	917 W. Seventh St., Plainfield.
Charles M. Biddle,	207 Bank St., Riverton.
C. Ledyard Blair,	Peapack.
W. P. Bonbright,	Bernardsville.
Glenn K. Carver,	90 N. Ninth St., Newark.
S. S. Dennis,	Morristown.
W. North Duane,	Convent Station.
Charles Evans,	Riverton.
Robert A. Fairbairn,	Westfield.
Thomas R. Finley,	44 Union St., Mount Holly.
W. F. Hanstein,	221 S. Vermont Ave., Atlantic City.
Edward Harding,	Fanwood.
Arthur B. Jones,	981 Central Ave., Plainfield.
James R. Joy,	80 Myrtle Ave., Plainfield.
Clarence H. Kelsey,	115 Prospect St., East Orange.
Walter H. Lippincott,	Riverton.
Carroll B. Merritt,	14 Pomeroy Ave., Madison.
Edward P. Mitchell,	Ridgewood Ave., Glen Ridge.
Rollo Ogden,	Summit.
Robert S. Parsons,	Nutley.
Winfield S. Peirsol,	107 S. Baton Rouge Avenue, Atlantic City.
John E. Sandmeyer,	195 Rosedale Ave., Newark.
George O. Smalley,	Bound Brook.
Oberlin Smith,	Bridgeton.
Inglish M. Uppercu,	Deal.
George C. Warren, Jr.,	94 Kensington Ave., Jersey City.

WORK OF THE DEPARTMENT.

The activities of the organized branches of the Department are covered by the reports of the State Geologist, the State Forester, the State Firewarden and the Museum Organizer, submitted herewith. They and the special interests with which the Board has been concerned are summarized as follows:

WAR WORK.

In common with those of most other State Departments, the normal activities of this have been materially modified by the war. The policy of the Board has been to maintain necessary controls and protective forces, as water-supply, the State forests, and the forest fire service, and then to use the Department's resources and men for emergency needs. Vacancies created by military service were kept unfilled until imperative need arose, when new appointments were made.

On March 27, the Director called the first State conference on the food supply, and thereafter the Department actively cooperated with the Departments of Agriculture, Public Instruction, and Labor in the preparation and distribution of emergency publications, in making necessary field studies and canvasses. It also furnished clerical help to the Department of Agriculture, which suddenly had an excessive burden thrown upon it. In cooperation with the State Chamber of Commerce a canvass of 6,600 industrial establishments, practically every one in the State, was made to secure the release of workmen to help out the farmers if, and when, such help should be needed. This produced promises of more than 1,700 men for periods aggregating about twenty-five thousand days' labor.

One of the tasks that fell to this Department was that of trying to reduce lost motion. After the first weeks there was little need to stimulate anyone to action, but a great need to accomplish definite things. It was soon apparent that the chief needs were Farm Labor, and a local Food Commission in each community which should provide guidance for an army of enthusiastic food gardeners and food conservers, and a means of keeping in touch with the farmers so that every legitimate need, including money or credit, should be satisfied. To help meet these requirements the whole organization of the Department was devoted. The successful issue of the effort, by which the area under cultivation was increased by from 15 to 20 per cent, and great crops safely harvested, is due chiefly to the Departments of Agriculture, Education, and Labor.

It is recognized that, tho the State has done well in food production it remains to grow even more next year and yet more the year after, and to see that little is wasted. But the country is fast being organized for effective work and the Department will do its share.

UNDEVELOPED LANDS.

One of the first subjects that engaged the attention of the Department was that of the undeveloped lands within the State. The situation and the opportunity have been presented in various ways, yet the Board welcomed a request made by the Governor for a report with recommendations. Careful studies were made during the spring and summer and a detailed report submitted. In that it was shown that the State contains upwards of a million and a quarter acres of land not now cultivated but capable of producing profitable crops under modern farming methods; that approximately 400,000 acres of this land were once farmed but now lie idle; that 600,000 acres are still wooded but possess soil of a quality to justify the removal of the forest; that 270,000 acres are in tide marsh, and 110,000 acres in fresh water swamp.

That these lands have been held out of use, under the exceptionally favorable conditions that obtain, was attributed to a stimulation of industrial activities at the expense of our agricultural interests, to inadequate country roads and to mosquitoes. Maps and Tables exhibited the unequal distribution of the State's population; showed the extremely low valuation of a large part of our territory, and emphasized the startling fact that three-fourths of our people live in communities of over 2,500 and are food consumers, while less than one-tenth are directly connected with food production.

To remedy this really dangerous condition it was recommended that the State (1) advertise its exceptional advantages with a view to attracting farmers from other states and from its own cities; (2) undertake to make farm life more attractive by lessening its hardships and uncertainties; (3) provide good country roads to serve the farms; (4) find necessary labor and control the present competition between farms and factories; (5) eliminate the salt-marsh mosquitoes, as the surest means of attracting outsiders to our towns and resorts as well as to our farms. The report is published in full on page 69.

MOSQUITO CONTROL.

Further study strengthens our conviction that control of the salt-marsh mosquitoes is a necessary beginning in any general effort toward State development. The Board believes that effective control is practicable and is convinced that salt-marsh mosquitoes, more than anything, or than all else, are responsible for the backwardness of the eastern and southern sections of the State. They have depopulated farms, prevented the growth of towns, hampered the development of shore resorts and restricted the extension of suburban communities. Other forms are troublesome, but, as they do not travel so far as the salt-marsh species, are subject to local control.

Tho thirteen counties are spending this year $213,585 for mosquito work, most of it is used, quite properly, in fresh-water control. The State's entirely disproportionate and inadequate appropriation of only $10,000 is devoted entirely to the marshes. Perhaps the counties can and will rid their marshes of the pests, tho those which have the most marsh are poorest in all else. In any case, the task is of State magnitude and the benefit is to the whole people. Moreover, the sooner it is completed the further will other efforts be advanced.

We are not advocating an experiment, not an effort whose issue is doubtful, but the rapid completion of a most important work already well advanced. Few people realize the extent of the control already exercised in this State. The map on opposite page exhibits the present condition. The marshes of Bergen, Essex, Union, Middlesex, and Monmouth counties have been so nearly completely drained that the original area of infestation is reduced to a fraction; those of Ocean and Atlantic counties are well advanced; Cape May has made a good beginning, but in Burlington, Cumberland and Salem about 100,000 acres, one-third of the whole salt marsh, are still untouched.

In all there have been constructed approximately 12 million feet of ditches by which 95,000 acres of marsh are drained. About 190,000 acres are still to be drained, and it has been carefully calculated that the whole work can be completed, and the practical elimination of the salt-marsh mosquito accomplished, *within five years* for not over $750,000, in addition to what the counties provide. It is also estimated that the removal of the incubus will so stimulate every interest in the State that within twenty years the ratables will be increased by no less than 500 million dollars. Can the State do better than spend three-fourths of one million to produce such a result? Better still, why should it not do the work with prisoner labor? This is urged as a practical means to a very practical end.

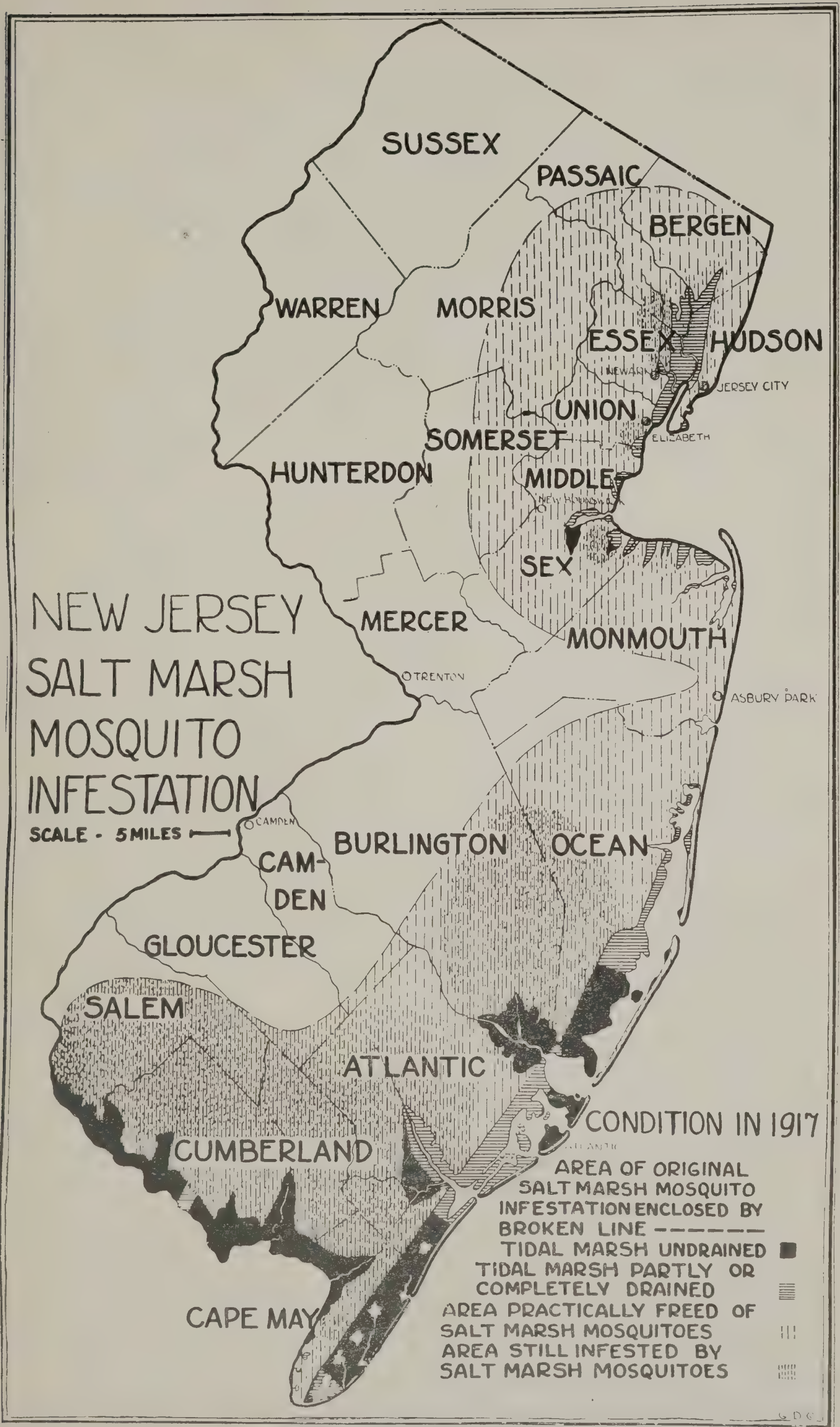


Fig. 2. SALT-MARSH MOSQUITO INFESTATION. The Great Reduction in the Original Infested Area Indicates That the State Can Be Freed Entirely.

SMALL-TOWN INDUSTRIES.

In every part of the State—outside rather than within the metropolitan district, are small communities with the best railroad, highway, and waterway facilities, with good schools and other social advantages, and with strong farming sections nearby, that offer exceptional advantages to small or specialized industries. It is desirable that manufacturing establishments be induced to locate in parts of the State where there now are few.

FORESTRY.

Progress continues to be made in the effort to give real value to our two million acres of woodland by instructing and helping owners, and by giving greater security against forest fires.

The forests in many sections are noticeably better than they were a few years ago, and those owned by the State (now 15,677 acres) are proving a State asset of increasing value. As the State Forester indicates (p. 59) some of these are capable of becoming much more valuable through the expenditure of a very moderate sum of money. The street shade trees, whose value has been estimated at upwards of twenty million dollars, are looked after by more than 89 Shade Tree Commissions (p. 62) in as many municipalities, and the enemies of our forests and trees (p. 66) are closely watched by the foresters of the Department in co-operation with the State Plant Pathologist and the State Entomologist.

The Forest Fire Service records another year of strenuous effort, with 871 fires, large and small—the greatest number we have ever had in any year except 1915. Tho some of these fires occurred in territory from which reports were not received before this year, the total is considerably above the normal. The facts that 362 fires were in North Jersey—more than ever were reported from that section before, and that the season extended through December, prove the need of an active warden service at all times. This the Department is constantly striving to provide, and this year it secured the appointment of 4 more local wardens, making the present number 331. To control this force, and to keep it efficient by the prompt payment of the State's half of the bills, is no longer possible with the funds available; more money must be provided. There is no ground for discouragement in an increased number of fires, or even in increased losses at times, for our woodlands and all property adjacent to them are more exposed every year through the greater number of people who come into contact with them. Even our protective efforts tend to increase the fire hazard because under protection the forests produce more material to burn than they do when fires are allowed to run over the same ground frequently. Positive, permanent security will come only when the whole community shall have been educated to the point of being extremely careful about all fires in the open and with smoking materials.

The success attained in controlling the deer hunters (p. 118) is noteworthy, and the Board is glad to record its appreciation of the readiness with which the hunters complied with the necessary restrictions in respect to fires in the woods, tho the fact in no wise alters its conviction that deer and rabbit hunting should not be encouraged. (See p. 17.)

STATE PARKS.

There is great need of places to which the people of our large cities can go for recreation. Palisades Interstate Park has many attractions, but is more accessible to New Yorkers than to our own citizens. The lakes in Morris, Passaic, and Sussex counties attract many visitors, yet the forested highlands in the same section, in every way as attractive as the Catskills in New York, or the Berkshires in Massachusetts, are almost unknown. The State now owns nearly 7,000 acres of the highest land within its borders, fully forested and near several attractive lakes. For a very moderate sum of money this property can be made available for tramping and short-time camping, as recommended by the State Forester (p. 59).

WASHINGTON CROSSING PARK.

After a very careful study of this project the Board has approved and directed to be published with this report the report of a special committee in which the matter is dealt with at length. See page 95.

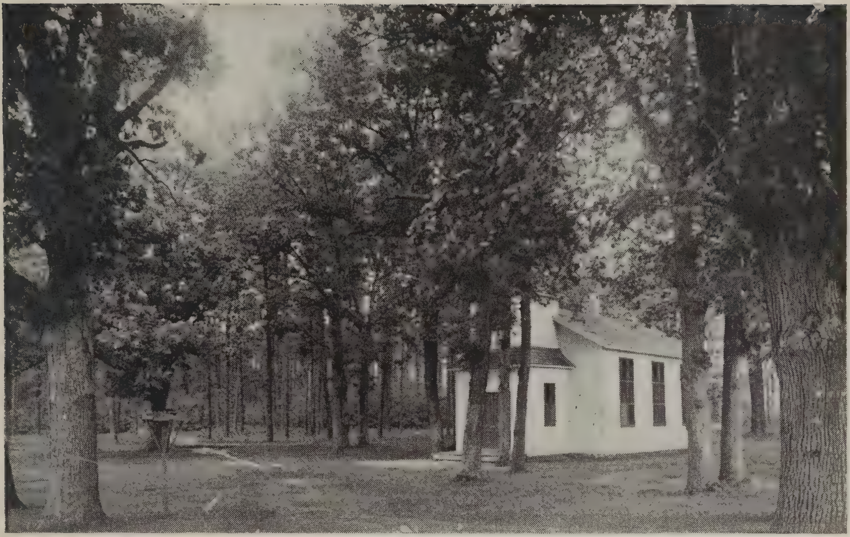


Fig. 3. A Country Church Located in a Native Grove is More Attractive than a Church with Planted Trees About It. Ocean County.

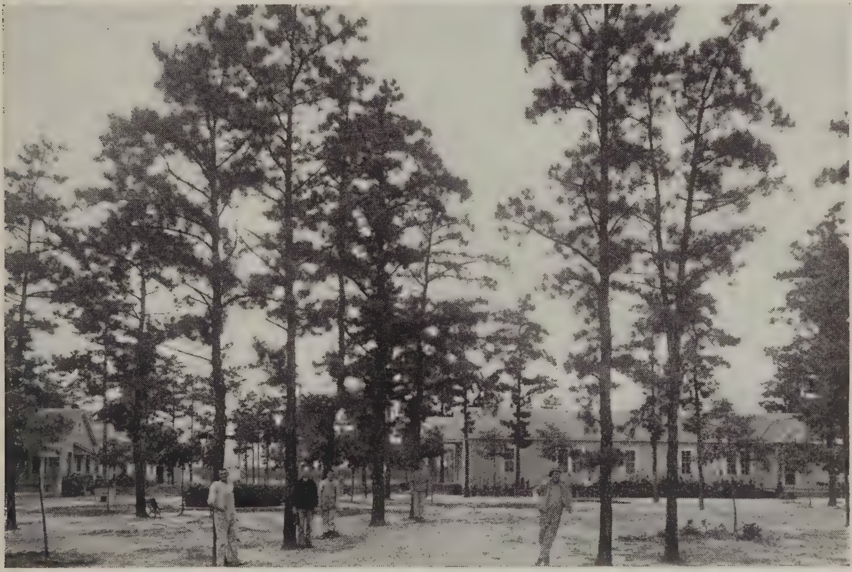


Fig. 4. A Section of the Colony for Feeble-minded Males on the Lebanon State Forest. Much of the Daily Labor is Done by the Inmates.

The conclusion reached is that the Board is reluctant to recommend the completion of the plan adopted by the Washington Crossing Park Commission upon the ground that the great outlay and the high maintenance charge involved are not justified by any expressed desire of the people at large. It does believe, however, that a worthy memorial to Washington should be erected near his historic crossing of the Delaware, and that it should be provided by the people of New Jersey. Power to accomplish this will be asked of the next Legislature.

WATER RESOURCES.

The rapid growth of the State, especially within and adjacent to the Metropolitan district, is reflected in the demand for increased water-supplies. No difficulty has yet been encountered in securing what is needed, tho several municipalities are approaching the limit of their present sources and it is already apparent that the further development of some of these communities may be determined by the quantity of potable water that they can provide.

The Wanaque project under the direction of the North Jersey District Water-Supply Commission was promptly approved by this Board. A writ of certiorari to review this action was taken by the Society for Promoting Useful Manufactures, but was dismissed by the Supreme Court, who held that the Board was acting within its powers in attaching certain conditions to its approval. An appeal has been taken to the Court of Errors and Appeals. The opinions in this case, and the disposition of other applications, are detailed in the report of the State Geologist.

Having now organized this branch so that the records are complete and readily available, and so that all applications for new diversions can be promptly handled, it is the purpose of the Board to study the water situation in all its bearings with a view to meeting whatever needs may arise.

STATE MUSEUM.

The purpose of the Board to make the State Museum an active adjunct to the educational system of the State, in effect a branch of visual instruction, has been well begun, tho the lack of money and lack of space have greatly restricted the effort.

The newly installed exhibits, and particularly the special temporary exhibits, attracted a total of 28,022 visitors during the year —a large number of them being school children who came singly and in classes. The plan to take the museum to every out-of-town school, by means of traveling exhibits and loan material, is well under way and is enlisting the lively interest of the teachers. Many people connected with industrial, agricultural, social and other activities also see in the program a means of making known the manifold advantages and attractions of the State.

But this important work cannot develop in its present quarters; more room for exhibits, and, above all, more working space in which to prepare loan material, are imperatively needed. (See p. 51.)

TESTING LABORATORY.

With the occupation of the new laboratory building, now nearly completed, the Department will be able to continue its analytical and research work under much more satisfactory conditions, as well as to carry on the cooperative work in testing road and other materials performed for other departments.

SHARK RIVER INLET IMPROVEMENT.

The many difficulties attendant upon this project have finally been overcome and the work is expected to be completed in the near future. The mouth of Shark River, which formerly wandered as much as a quarter of a mile up and down the coast, changing with every tide, is now controlled by concrete jetties. The channel is open at all stages of the tide, and a considerable area of valuable beach front has been added on each side. (See p. 24.)

EXHIBITS.

The cabin on the Trenton Fair Grounds in and about which a Forestry Exhibit has been shown for several years past, was made available as headquarters of the Second Regiment State Infantry while it was encamped nearby. Being vacated in time, a Departmental Exhibit, in which the work of the State Museum and of the Mosquito commissions was prominent, was set up and proved to be more attractive and practical than the former exhibits devoted solely to Forestry. (See Frontispiece.)

ALTITUDE SIGNS.

In response to a request made on behalf of a number of autoists, the altitude of a great number of points has been added to the Forest Fire notices posted along the main highways. The figures, which are carefully determined from State maps, indicate the true elevation above sea level; they will not be found on all such posters, but it is intended that every prominent point, important bridge head and hill crest shall be so indicated (fig. 18).

DAMAGE BY GAME ANIMALS.

For several years this Board, like its predecessor, the Forest Park Reservation Commission, has been convinced that the present game laws are opposed to the principles of conservation and that they work great hardship to many farmers and forest owners. After the destructive forest fires of November, 1914, which burned during the hunting season, and some of which were clearly caused by hunters, the Forest Commission recommended that all protection be removed from deer and rabbits, as a measure of justice to the farmers whose crops were destroyed, and as the surest means of keeping crowds of hunters out of the woods at a season when the fire risk is apt to be great. This recommendation met with strong opposition and nothing was done. In its report for 1915 this Board renewed the recommendation in the conviction that material interests of value were being sacrificed to sport. Tho forest fires in the hunting season have been much less serious since 1914, every year many are traced to hunters and complaints of injury suffered are recorded.

Last spring the situation became aggravated and a number of farmers found great cause for complaint. While the State was striving by every possible means to increase food production and avert a National shortage, appeal after appeal for protection against the deer was received. In North Jersey as well as in South Jersey the animals left the woods and destroyed growing crops. In some cases the damage done entailed real suffering to small farmers. Tho the Governor wisely ignored the law and prevented later loss by advising that the deer be driven off with guns, such action could serve the emergency only. The State must deal with the fundamental question and decide whether the deer or the farmers are to have protection. Complaints about rabbits have been less serious, tho all our information is to the effect that the animals do much damage in gardens and orchards and that the hunters who pursue them do more. This Board is convinced that in a highly organized State like New Jersey, there is not room for free hunting, especially of deer and rabbits, and for forestry and farming, and renews its recommendation that these animals be no longer protected by law. It is neither fair nor right to impose upon the farmers and woodland owners the burden of feeding and sheltering the wild game that outsiders pursue on private property under authority of the State. Nor will the issue be met by increasing the fee for hunting licenses and from the receipts paying for damage done, because the burden of proof again falls upon those whom the State should protect.

PRISONER LABOR.

The Board is in entire accord with the policy of doing away with contracts in the State Prison and employing the convicts upon necessary work for the State. The Director has taken part in a number of conferences, several with the Prison Inquiry Commission, and recommended that all trustworthy prisoners and reformatory inmates fit to work outdoors be employed upon the highways, in draining the mosquito marshes (see p. 70), to replace free labor at State institutions, and to develop a State forest park (see p. 59). Tho this program involves an outlay for maintenance, and no direct income, except perhaps on account of labor furnished State institutions, it provides for important betterments and conforms to modern reformatory principles.

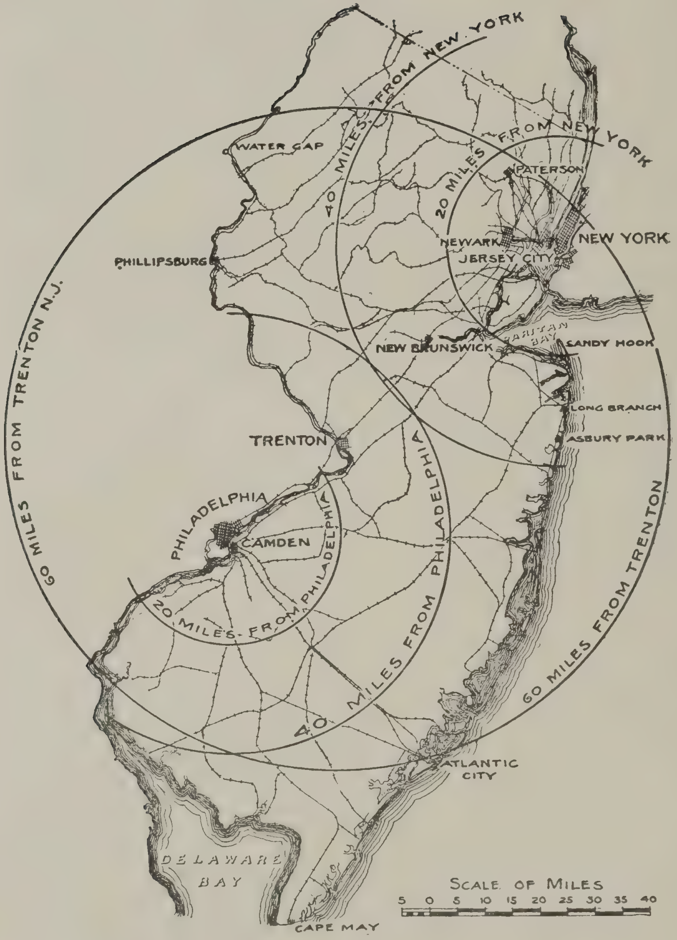


Fig. 5. New Jersey Occupies the Most Advantageous Position in the Union. Over Ten Million People Live, Work and are Fed Within Sixty Miles of the State House.

THE FUTURE.

Since its organization in 1915, the Department has not been content merely to carry on the interests inherited from its predecessors, but has striven to extend its activities and to find means of developing every latent State resource. Several of these are referred to in this report and the means by which the growth of the State can be stimulated are pointed out. None of these things, however, will get done of itself, but each must be adequately financed, and the Board will appeal to the Legislature for a reasonable appropriation to carry at least a part of them forward.

The most imperative needs for which money is required are summarized thus:

1. To advertise the State and its resources to the end that new people, especially farmers and laborers, be attracted to us.
2. To get rid of salt-marsh mosquitoes that the real advantages of our territory may become known and appreciated. It is immaterial whether this Department or another be entrusted with this task.
3. To develop the State Museum as an important and necessary adjunct to the school system.
4. To strengthen the Forestry branch, and especially the Forest Fire Service, so that our woodland owners may be encouraged to make their properties productive.
5. To develop the State lands in Sussex County as a forest park, especially for the recreation of the people who live in the cities of North Jersey.
6. To present the advantages of many of our smaller towns, outside the metropolitan district, for industrial location.

THE BOARD OF CONSERVATION AND DEVELOPMENT,

by ALFRED GASKILL, *Director.*

Financial Statement.

FOR THE FISCAL YEAR ENDING OCTOBER 31, 1917.

RECEIPTS.

Appropriation for Maintenance	$62,700.00	
Appropriation for Township Fire Bills	4,000.00	
		$66,700.00

DISBURSEMENTS.

Administration—		
Salaries, Executive and Clerical	$9,560.52	
Field Expenses, Executive and Clerical	182.65	
Stationery and Blanks	892.41	
Postage	1,311.50	
Telegraph and Telephone	236.16	
Books, Instruments and Furniture	713.90	
Insurance	78.30	
Advertising	1,010.85	
Incidentals	274.47	
Division of Geology and Waters—		
Salaries, Technical Force	11,481.84	
Field Expenses, Technical Force	2,746.90	
New Maps	2,147.28	
Salaries, State Museum	2,543.13	
Field Expenses, State Museum	66.18	
Material, State Museum	1,604.40	
Salaries, Testing Laboratory	3,208.87	
Field Expenses, Testing Laboratory	289.12	
Material, Testing Laboratory	1,119.89	
Division of Forestry and Parks—		
Salaries, Foresters	4,025.57	
Field Expenses, Foresters	605.51	
Salaries, State Forest Wardens	1,134.00	
Maintaining State Forests	1,015.32	
Salaries, State Firewardens	7,723.96	
Field Expenses, State Firewardens	4,248.56	
Equipment, State Firewardens	88.70	
Township Fire Bills	4,411.68	
Held for Fire Bills not ready	2,088.32	
Transferred to Laboratory	1,139.00	
Unexpended	626.20	
		$66,700.00

NEW TESTING LABORATORY.

Appropriated for Building	$23,500.00	
Transferred from Maintenance for Building	1,139.00	
From Road Department for Equipment	10,000.00	$34,639.00
Contracts		34,639.00

SHARK RIVER INLET IMPROVEMENT.

Appropriations, State and Local		$114,000.00
Expended to October 31	$103,270.95	
Reserved for Rentals	6,145.00	
Lapsed to State Treasury	1,044.42	
	$110,460.37	
Available Balance	3,539.63	$114,000.00

CASH ACCOUNT.

RECEIPTS.

Balance on hand November 1, 1916		$8.524.03	
For Maps and Reports sold		1,232.39	
For Copies of Records		64.60	
For Products of State Forests sold		87.50	
For Rent, etc., of Washington Crossing property		288.41	
For Foresters' Expenses refunded		8.99	
For Settlements with Sundry Violators of Forest Fire Law		2,665.07	
Miscellaneous		23.12	$12,894.11

DISBURSEMENTS.

Paid State Treasurer		$10,460.89	
Paid Sundry Township Treasurers		2,253.13	
On hand October 31, 1917—			
Due State Treasurer	$161.09		
Due Township Treasurers	19.00	180.09	$12,894.11

Report of the State Geologist.

HENRY B. KÜMMEL.

ADMINISTRATION.

Scope of Report.—As in previous years, this report is in the main a summary of the various lines of activity pursued by members of the Division of Geology and Waters. The scientific results are published as maps and special reports.

Publications.—The following special reports and maps were published during the year:

Catalogue of Lantern Slides, available for lending to schools.

Bulletin 18. Report on Indian Habitations in Warren and Hunterdon Counties, by Max Schrabisch. (In final proof at end of year).

Volume VIII. Surface Deposits of Southern New Jersey, by R. D. Salisbury and G. N. Knapp.

New editions of Topographic Atlas sheets Nos. 25, 28 and 36, on a scale of 1 inch=1 mile.

New edition of Pluckemin Topographic Atlas sheet, on a scale of 1 inch=2000 feet.

New editions of the Morristown Topographic Atlas sheet, scale 1 inch=2000 feet, and the Geologic map of New Jersey were in the hands of the engraver at the end of the year.

Distribution.—The sale of maps for the year as compared with figures for the two years previous was 1915, 3,035; 1916, 4,938; 1917, 5,043.

TOPOGRAPHY AND ENGINEERING.

Bench marks.—In continuation of work begun in October, 1916, lines of levels were run during November and a part of December, as follows:

1. From Perth Amboy through Hightstown, Bordentown, Burlington and Mount Holly to Moorestown and Camden.
2. From Burlington to Camden.

3. From Monmouth Junction through Freehold to Sea Girt and thence along the sea shore to Highlands.
4. From Keyport to Freehold.

These lines aggregated 952.6 miles, but there were many short runs between bench marks which added largely to this distance. Within the territory covered the original bench marks numbered 43, of which 22 were recovered and verified, and 21 had been destroyed. The recovered bench marks, together with the new marks established, give a total of 291 in the territory covered against the 22 old marks found intact. The above figures include the work done October 17-31, 1916, in the previous fiscal year. The cost of the field work was $1,129.10, or $7.40 per mile of levels run, short runs between bench marks not included, or $3.88 per bench mark established or recorded. If supervision and the office work in checking up and in preparing a manuscript report be included, the cost was $9.25 per mile of levels run and $4.85 per bench mark established.

This work was under the direction of C. C. Vermeule, the leveling being done by Loren P. Plummer, Jr. The list of bench marks established will be published as a separate bulletin.

Shark River Inlet.—As stated in previous reports, the work of completing the jetties at Shark River Inlet was assumed by the Department on the failure of the contractor in August, 1915. Work was commenced by the Department in October of that year with results which have already been made public.

Through financial aid rendered by the Boroughs of Belmar and Avon, it was possible to complete the west end of the north jetty early in November, 1916. During the balance of that month and until January 25, 1917, the south jetty was extended eastward to the edge of the beach, the funds for this extension being furnished by the Borough of Belmar. It was then necessary to suspend work pending further appropriation by the Legislature, but negotiations were undertaken with the Trustee in Bankruptcy looking toward the acquisition of the plant and the settlement of his claim for rental. An offer to purchase the plant outright was made, but after long delay was refused.

On April 10, 1917, work was recommenced, the Legislature having provided $19,000 additional. The entire plant and equipment were moved to the north side of the inlet and the railroad trestle across the inlet was taken up. This was an added expense to the work, but was made necessary by the peremptory orders of the United States War Department that the trestle be removed before May 15, 1917, owing to the alleged obstruction to navigation, the inlet being used by pleasure craft and fishing dories.

On June 9, the equipment belonging to the former contractor, which the Department had been using, was sold at public auction under an order of the United States District Court, and the Department was deprived of its use. This caused both delay and expense in assembling a new plant to continue the work. But these difficulties were finally overcome, and at the close of the fiscal year the extension of the north jetty seaward was in progress.

At the close of the year the adjudication of the claim for rental for the use of the contractor's plant was still pending before the commissioner appointed by the court, but the final hearing had been held, and an early decision of this question was hoped for.

Revision of maps.—During the year atlas sheets numbered 25, 28, 35 and 36, on scale of 1 inch per mile, and the Somerville, Pluckemin and Morristown sheets, on scale of 2,000 feet per inch, were revised in the field and the culture brought up to date. Copy was prepared for the engraver, and new editions of sheets 25, 28, 36, and Pluckemin printed; the Morristown sheet was in the hands of the engraver, the draftsman had completed the office work on No. 35, and it and the Somerville sheet were ready for the lithographer.

The topographic work, as in previous years, was in charge of C. C. Vermeule, Topographer and Consulting Engineer.

MINERAL STATISTICS.

The value of the mineral production of New Jersey during 1916 amounted to $40,339,540, an increase of $7,035,423 over 1915, according to statistics collected by the Department in cooperation with the United States Geological Survey. By the collection and compilation of these statistics the Department is enabled to keep in touch with the mineral industries of the State. This work is under the immediate supervision of Dr. M. W. Twitchell, Assistant State Geologist. Further details regarding this subject are given on pages 137-141.

GREENSAND MARL AS A SOURCE OF POTASH.

Demand for potash.—Previous to the war practically all of the potash-bearing materials used in this country in the manufacture of fertilizers came from Germany. In addition, almost the entire supply of commercial salts of potash came from the same source. Early in the war this supply was cut off, and in 1916, the total imports of all potash salts were only 1.1 per cent of those for 1913, the last year before the outbreak of hostilities.[1] The approximate total consumption of potash in the United States for the four years previous to 1914 averaged about 269,000 short tons, the total cost including freight at American ports being about $13,050,000 per year.[2]

The uses of potash are manifold. The greatest amount consumed in this country is in the manufacture of fertilizers. It is essential in the making of the best liquid soap and some of the higher grade cake soaps, in the better grades of glass, and in certain explosives. It is extensively used in matches, in tanning, dyeing, certain metallurgical processes, electroplating, and photography. Its medicinal uses are various, and there are minor chemical uses not included in the above list.

In view of this demand and the stoppage of imports, there has naturally been a determined effort to produce potash in this country, an effort greatly stimulated by the high prices which have prevailed. During 1916, the production of potash salts and potash products reported to the United States Geological Survey was equivalent to 9,720 short tons of potash (K_2O) valued at $4,242,730 at the point of shipment. This was ten times the amount reported for 1915. During the present year production has increased considerably. From January to June, 1917, it was 14,023 short tons of potash (K_2O) valued at $5,864,039.[3]

The prices quoted range from $3.50 to $6.00 per unit, a unit meaning 1 per cent of potash (K_2O) in a ton of material as marketed,—that is, a product carrying 25 per cent of K_2O (25 units) at $6 per unit would be worth $150 per ton.

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[1] U. S. G. S. Mineral Resources of the United States, 1916, Part II, page 75.

[2] Idem, page 76.

[3] U. S. G. S. Press Bulletin, Sept. 20, 1917.

Potash occurs in small quantities in many common rocks as an insoluble compound, most commonly a silicate, and in this form is not available for use as a fertilizer. Its transformation from the insoluble to the soluble form by a cheap and workable process has been the goal of many investigators. Between August 1, 1914, and January 1, 1917, no less than forty-five patents were issued at Washington, D. C., for processes involving the recovery of potash in soluble form from its silicates.[1]

Occurrence of greensand marl.—The greensand marl beds of New Jersey have long been known to contain from 4 to 7 per cent of potash present in the mineral glauconite. These beds occur as widespread sheets, which extend across the State from Atlantic Highlands to Delaware Bay. Their edges appear at the surface as irregular belts, locally covered by younger formations, their location being accurately shown upon the geologic maps published by the Department and its predecessor, the Geological Survey. Years ago these deposits were extensively dug and the marl was spread as fertilizer directly upon the land. Large openings near Farmingdale, Marlboro, Hornerstown, Birmingham, Vincentown, Medford, Marlton, Kirkwood, Blackwood, Sewell, Mullica Hill, and Woodstown, as well as smaller pits at points too numerous to mention, testify to the high esteem in which the marl was held by a previous generation of farmers, and the extent to which it was used.

Most of these workings have been abandoned for so many years that little can now be learned on inspection as to the character of the marl and the thickness of the deposit. The early reports of the Geological Survey, written when the pits were open to view, are still the best records we have. Much interest in these deposits has been manifested and the State Geologist has received many inquiries regarding them. A recent canvass of the field showed that within the last two years small quantities of marl had been dug at a number of points and shipped to various places for experimental purposes, some as far as Pittsburgh, Chicago, and even to Nebraska.

Utilization of the greensand marl beds.—At Marlton, the Atlantic Potash Company has opened a pit along the railroad and is shipping to Stockertown, Pa. The following section was exposed in late September, 1917.

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[1] For list see U. S. G. S. Mineral Resources of the U. S., Part II, page 125.

A.	Sandy clay and gravel	3 to 5 feet
B.	Shell bed	3½ feet
C.	Dark green to black marl	7 feet exposed.

The marl was reported to extend to a depth of more than 40 feet, the bottom not being reached in digging. It is dug in pits, which fill with water soon after excavation unless pumped out, so that the earlier workings could not be examined. The shell bed is a solid mass of shells, chiefly *Gryphaea dissimilaris* (Weller) and *Terebratula Harlani,* the shells of the upper 2½ feet being partially decomposed, iron-stained, and fragile, while those in the basal portion are hard, white, and unaltered. The line of demarcation between the two is sharp.

At the time of my visit the marl was loosened in the pits by shovels and loaded on cars by a crane and clam-shell bucket. An 1,800-ton capacity Bucyrus cable dredge had been ordered and was expected shortly. The company began work about June 1, but had been hampered in shipments owing to difficulty in obtaining cars, and in digging by lack of proper machinery.

The marl is shipped to Stockertown, Pa. (near Easton), where the company has purchased and refitted the old plant of the Northampton Portland Cement Company. It is heated with calcium chloride in rotary kilns under the von Kolnitz patent, the soluble potassium chloride being obtained from the calcined mass by leaching and afterwards recovered from the solution. Operations were begun about the first of June, 1917, and some potassium chloride has been manufactured, but as in all new enterprises, the earlier months were largely periods of mechanical experiment and adjustment. The company is reported to be well-backed financially, and at war prices should be highly successful. It is safe to assume that those financing the venture have reason to believe that even under normal conditions they can operate at a profit.

Near Pemberton, Ivins Horner has made some small shipments from stock piles dug in 1914 to parties wanting samples for experimental purposes. He is said to have 18 feet of green marl beneath 3 to 4 feet of stripping and 2 to 2½ feet of gray marl.

At Birmingham, William Hoffman owns a large pit from which he has made sample shipments. He digs 16 feet of marl beneath 8 feet of stripping, but does not go to the bottom of the bed on account of water. Analysis of this marl shows a potash content of about 7 per cent.

At Vincentown, Barclay Allen has dug several pits, but for what purpose was not learned.

At Sewell, several carloads of marl were dug late in 1916 at the pits of the West Jersey Marl and Transportation Company and shipped to the Waverly Chemical Company, Camden. It is reported that hydrated carbonate of potash for the cut-glass industry was obtained from this marl, its manufacture being possible because of a price of 35 to 45 cents per pound instead of 3 or 4 cents.

In September, 1917, Howard Davis was digging marl, which was hauled to Sewell, a mile distant, and shipped by rail to some point outside the State, probably for experimental purposes. Between 14 and 15 feet of marl are dug here beneath 9 or 10 feet of stripping.

Some time in 1916, 50 tons of marl were dug on the property of Mrs. E. B. Sharp, near Mullica Hill, and shipped to Stockertown, Pa., probably for experimental purposes.

Doubtless there have been other sample shipments of which the Department has no record. Of themselves the above operations are of no importance, but as indicative of a widespread interest in the utilization of these deposits, and the study and experimentation now being given to this problem, they are of great significance.

Availability of marl.—The marl deposits of New Jersey which are within easy reach of the surface are practically inexhaustible. For the most part they can be readily dug at a minimum of expense, the disposal of the water being the chief difficulty, since the stripping of a new pit is thrown into the one already dug. Analyses indicate that the New Jersey marls carry from 4 to 7 per cent of potash, and that they are of a higher grade than those of adjoining states. Assuming a thickness of 15 feet, an acre of marl would weigh in the neighborhood of 72,000,000 tons dry, and would carry from 1,400 to 2,500 tons of potash. At present prices abundant financial rewards await the successful development of a commercial process for its transformation. With an average potash content of 6 per cent in the dry marl, and assuming a 75 per cent recovery, the available potash in a ton of marl at $4.00 per unit would have a value of $18.00, and at the maximum quoted price of $6.00 per unit, of $27.00, whereas at prices prevailing before the German supplies were cut off, the value was only $3.51.

At pre-war prices, therefore, the outlook is not encouraging, but this fact must be kept in mind. Pre-war conditions will probably not prevail until a long lapse of time after the war is over. The shortage of labor abroad, the scarcity of vessels, and high ocean freights will all combine to prevent a return to the old prices for a considerable period. All things considered, the outlook for the utilization of the greensand marl deposits is brighter than for many years.

PROSPECTING FOR OIL.

Drilling for oil has continued in several parts of the State during the past year. The reputed discovery of oil near Millville heralded in the newspapers in October, 1916, and discussed in the Annual Report of last year, amounted to nothing. For months no work was done at the well owing to the loss of tools and obstruction of the casing, but the sale of stock in an oil and realty company controlling adjoining territory was actively pushed by some of the persons interested in the company which sank the well. Later the well was cleared out and drilling was resumed, but at the close of the year no oil had been discovered.

Sometime in the summer a well was started a few miles southwest of Hammonton. The Department has been able to learn very little regarding it, but no oil has been found.

Early in the fall, a well was started near Newport, Cumberland County, about 10 miles southwest of Millville, in the expectation that by deep drilling it would be possible to reach the oil sands underlying the Trenton limestone,—formations which in Ohio and western Pennsylvania are oil-bearing. There is absolutely no reason for believing that these formations underlie the southern part of New Jersey, and all geological knowledge is contrary to such a belief. If there is no better basis for the occurrence of oil than the supposed presence of the Trenton limestone, the effort is doomed to failure.

During the year the attempt to find oil near Cassville in Ocean County was definitely abandoned and the machinery removed. It may be worth noting that the promoters, when the work was begun, were advised by the State Geologist that their chance of obtaining oil was extremely remote.

A well has been started in the Triassic shale (Newark series) near the line of the Reading Railroad, about 1 mile north of Belle Mead station, Somerset County, and at the end of October, 1917, was reported to have attained a depth of between 1,700 and 1,800 feet.[1]

In the last report the State Geologist stated his reasons for believing that the discovery of oil in southern New Jersey is extremely improbable if not entirely impossible. Nothing has occurred during the year to alter that conviction. On the contrary, events have only confirmed the soundness of his opinion. Facts have come to his knowledge which verify what he formerly suspected, namely, that the reputed discovery at Millville was a fake pure and simple, altho not all of the persons interested in sinking the well had knowledge of the fraud. He can only reiterate his conclusions of a year ago that the existence of an oil pool of commercial importance is improbable, and that all drilling for oil here is extremely speculative and should be undertaken only by those who fully understand the hazards of the game and can afford to lose their entire venture. The public should therefore beware of stock-selling schemes based on reported discoveries or assumed occurrences of oil in New Jersey.

WAR MINERALS.

Defined.—Certain mineral products are absolutely essential for the successful prosecution of the war. Some of these the United States produces in large quantity. Others, less well known perhaps, but no less essential, have heretofore been imported, altho this country may have undeveloped deposits of some from which its needs can be supplied. The scarcity of shipping, and the need for the transportation of men, munitions, and food supplies, demand that every effort be made to utilize all domestic sources of supply. The scarcity of potash, and the field which New Jersey may occupy in making good this deficiency from its deposits of greensand marl, have already been discussed. Manganese and pyrite are two other war minerals of which there is great scarcity and great need.

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[1] This attempt was definitely abandoned in December, 1917, at a depth of 2,100 feet, no trace of oil having been discovered.

Manganese.—Manganese is essential in the manufacture of steel. It is estimated by the United States Geological Survey that during 1918 the United States will need 850,000 to 900,000 tons of high-grade manganese ore. The domestic production of high-grade ore during 1917 will probably be about 80,000 long tons. The balance must be imported, chiefly from Brazil, unless the domestic output can be largely increased by (1) the discovery of new deposits, (2) enhanced production from active mines or reopening of old mines, and (3) improvement of milling methods.

New Jersey produces some manganese in connection with the zinc ore mined at Franklin Furnace and Ogdensburg, and many years ago a small amount was dug near Clinton and Annandale. Recent examination of this deposit shows it to be a series of lenses or veins covering about 1,200 feet in length and from 6 inches to 2 feet in width.[1] A sample of ore sent to the Survey from near Clinton, probably from this deposit, showed on analysis 39.9 per cent of metallic manganese. Manganese ores are rated as high-grade when they carry in excess of 40 per cent manganese, and low-grade when the manganese content is between 5 and 40 per cent. In March, 1916, 50 per cent manganese ore suitable for making ferro-manganese sold for $32.50 per ton, and late in the year the price rose to $39.00.

Pyrite.—Under the conditions imposed by the war there has been an enormous increase in the demand for, and production of, sulphuric acid, the production in the United States during 1916 being valued at $73,514,126. This has increased greatly the demand for the sulphide minerals pyrite and pyrrhotite, which are sources of sulphuric acid. Three and one-half times as much pyrite and pyrrhotite are imported as are produced in this country. With probable increased demands for sulphuric acid, and possible curtailment of imports due to destruction of shipping by submarines, pyrite and pyrrhotite have become two of the important war minerals, the increased production of which in this country is essential.

Pyrite in small amounts is a very common mineral and is widely disseminated in New Jersey, but amounts large enough to be mined profitably have not yet been discovered in this State. That such masses may exist in the crystalline rocks of the Highland belt is possible. It occurs as nodules in most of the clay beds extensively dug in the Woodbridge-Perth Amboy-South Amboy clay district, where it is known as "sulphur" or "sulphur balls." In some layers it is so abundant that the clay cannot be used; in other beds the occasional nodules can be picked out by hand as the clay is dug. While perhaps no great amount of pyrite is found in any one pit at one time, in the aggregate the amount rejected in mining the clay must be considerable.

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[1] **Letter from Kirby Thomas, Mining Engineer, New York.**

Realizing the importance of considering every possible new supply, the State Geologist obtained from the Bureau of Mines a list of purchasers of pyrite located near the clay region and sent it with an explanatory letter to all the active clay producers, in the hope that something might develop. It is apprehended that the chief difficulty to the utilization of this supply will be the relatively small amount which can be obtained from any pit at one time and the consequent high cost of collection. A varying composition may be another drawback to its use.

The Department urges the cooperation of the clay producer and the acid manufacturer in determining whether the nodules can be utilized.

ROAD MATERIAL.

Early in April the state geologists of all the Atlantic and Gulf States were requested by the National Research Council to furnish reliable information regarding the occurrence, character, and availability of materials for rapid highway and railroad construction in their respective states, together with a list of active quarrying plants and their capacity. In addition to the manuscript for New Jersey, a series of maps was prepared showing the distribution of the geological formations furnishing such material, and also the location of the quarries, gravel pits, etc. The report and maps were prepared in triplicate and forwarded for the information of the War Department.

SOIL SURVEY.

Differentiation and mapping of the soil of the State has continued under the direction of C. C. Engle, of this Department, and A. L. Patrick, of the U. S. Bureau of Soils, Washington, D. C. They have been assisted by Linwood L. Lee and Harold Miller, representing the State, and H. C. Smith, of the U. S. Bureau of Soils. In addition to the field work, the State Agricultural Experiment Station carried on collateral soil studies, chiefly the analysis of soil samples.

During November and December, as long as weather conditions permitted, field work was carried on in the Millville area. In the winter Mr. Engle was engaged in compiling field data and preparing maps summarizing the season's work. Mr. Lee was engaged in various phases of office work, while the U. S. Bureau of Soils men were transferred to other areas in the South.

In April field work was begun again in the Millville area and continued until late in June, when the men were transferred to the Belvidere area for the summer. The field work in this area was completed about September 22, and Mr. Engle resumed work in the Millville area, while Mr. Patrick prepared the report on the Belvidere region. It is expected that the Millville area will be completed about December 15 so that the report can be written during the coming winter and published soon after. During the year the area surveyed was about 859 square miles.

In addition to the regular work, a special investigation of the soils on a tract of about 6,000 acres in Monmouth County was made by L. L. Lee at the request of the Governor, the owner of the tract having offered it to the State for agricultural uses for a term of years. The investigation indicated that only a small portion was underlain by soils of high agricultural value.

In cooperation with the War Department, Mr. Engle spent some days at Camp Dix mapping the soils of a tract which it was contemplated to use for camp-sewage disposal. He found that the area of soil regarded by the engineers as of sufficient porosity to be successfully used was small, and other plans for sewage disposal were adopted.

Mr. Engle also spent several weeks in the spring in work under the direction of Dr. Jacob Lipman, of the State Agricultural Experiment Station, in the campaign for greater crops. This work interfered in a measure with the soil survey, but in view of the national emergency was fully warranted.

During the summer the report on the Camden area was printed by the Bureau of Soils, the field work having been done in previous years by the state and national organizations jointly. This Department has a limited number of copies of this report for distribution, but the bulk of the edition is sent out from Washington, D. C., either by the Congressman of the district, or by the Bureau of Soils.

TESTING LABORATORY.

Work done.—The reorganization of the State Highway Department and the increase in road construction and repair consequent thereon, has greatly increased the demands made upon the testing laboratory. The existing laboratory has been entirely inadequate in space, equipment, and personnel to meet these demands in full. In addition, much time and attention has been given to the questions arising from the construction of the new building.

During the year the following materials were analyzed and tested:

Kind	No.	Determinations made
Pavement samples	211	1266
Asphalt cements	149	213
Road oils	11	72
Road tars	6	27
Sand samples	54	540
Stone samples	20	100
Slag	2	10
Portland cement	6	30
Road gravel	1	6
Concrete gravel	7	75
Liquifiers	3	27
Lubricating oil,	29	290
	499	2656

In addition to the regular work, experiments have been carried on to determine the relative value of fluxes used to liquefy asphalt cements. Twenty-three brands of asphalt were tested in this way, over 350 separate determinations being made. In checking up the relative consistency of different asphalt cements, 175 additional determinations were made.

Some work was also done on standard samples of solvents received from the American Society for Testing Materials.

The preparation of specifications governing the grade of materials to be used in road work, together with the necessary preliminary tests, has taken a part of the chief chemist's time. He has also assisted the Highway Department by making field inspections of roads to observe the methods of construction.

With the limitations imposed by the lack of space in the present quarters for both necessary apparatus and assistants, it has been possible to do only the most important things. Many tests, experiments, and lines of work which ought to have been undertaken have perforce been omitted. With the completion of the new laboratory early in 1918, and additional assistants, it is believed that this condition can be remedied.

New laboratory.—As soon as possible after the first of the year plans and specifications for the erection, heating, lighting, and plumbing of the new laboratory were advertised, and on February 2, 1917, bids were received and opened. On February 7 the Board awarded the contracts to the lowest regular bidders, as follows:

Erection of building	S. W. Mather & Sons	$17,948
Lighting system	Electric Contracting Co.	1,395
Plumbing system	Piper Brothers	1,640
Heating system	Piper Brothers	2,480
		$23,463

In order to bring the total bids within the appropriation, it was possible to provide only the absolutely necessary construction and to eliminate some features, which, if more money had been available, would have been included. The contracts as awarded provided for a complete building, but did not provide for any of the equipment necessary.

Inasmuch as testing materials for the State Highway Commission is an important part of the work of the laboratory, and special machinery and equipment are needed for this work, that Commission transferred the sum of $10,000 to the Department of Conservation and Development under authority of Chapter 49, Laws of 1916, for the purchase of equipment. With this money an Olsen testing machine, alberene stone for work benches, supplies for plumbing about the ventilator hoods, not included in the regular plumbing contract, cupboards and closets were provided.

After the building was under cover, it was found that unless the work rooms were plastered the brick walls would be damp and the delicate apparatus injured. The situation was explained to the State House Commission and with their consent the sum of $1,139 was transferred from the general appropriation of the Department to the building fund for plastering certain rooms.

In the annual bill passed in April, the Legislature appropriated the further sum of $3,000, available after November 1, 1917, for the laboratory, with which additional equipment will be purchased.

STATE MUSEUM.

In the organization of the Department the State Museum is included in the Division of Geology and Waters, and is therefore under the general supervision of the State Geologist. Miss Helen C. Perry is in immediate charge, and its success as measured by daily attendance, amounting to 28,000 in ten months, the cooperation with the Trenton schools, the State-wide demand from schools for loan material, and the assistance of other State departments in special exhibits, is due entirely to her initiative, resourcefulness, and energy.

The technical experts of the Department, Dr. M. W. Twitchell, in particular, have assisted in the classification, labelling, and arranging of both the material for exhibition and the reference collections.

The reader is referred to Miss Perry's report for a statement of the activities of the Museum and its plans for the future.

DIVERSION OF WATER.

The jurisdiction of this Department, as successor to the State Water-Supply Commission, over the diversion of water for potable purposes is set forth in Chapter 252, P. L. 1907, and Chapter 304, P. L. 1910. During the year the Board has acted upon fourteen applications, with two pending.

Standard conditions.—Certain standard conditions are attached to each approval, and when circumstances demand, special conditions pertinent to the case in hand are added. The standard conditions cover the following points.

Limitation of term.—In the case of individuals and corporations, the approval is limited to a term of 30 years with the privilege of renewal for 20 years. This limitation is not imposed upon municipalities.

Beginning and completion of construction.—Construction must be commenced within 6 months and completed within 2 years (usually) from date of approval of application.

Acceptances.—Written acceptance of the terms of the approval must be filed within 3 months, failing which the approval is of no effect.

Diversion charges.—Approval is conditioned upon the payment of such excess diversion charges as are now or may hereafter be authorized by law.

Reversion to State.—If the source of supply be at any time abandoned, the rights and privileges conveyed by the approval revert to the State.

Permission to divert not to be transferred.—Permission to divert water granted by the approval of the application, shall not be assigned to any corporation or person without the consent of the Board of Conservation and Development.

Abrogation of approval.—Violation of conditions imposed and the establishment of such violation to the satisfaction of the Board abrogates the approval.

The special conditions imposed relate usually to the area to be supplied, the amount of water to be diverted, and maintenance of the dry-season flow of streams, and differ in each case.

Linden Water Company.—On September 6, 1916, the Linden Water Company, Rahway, made application for permission to divert water from the Rahway River to supply the Township of Linden, Union County. Public hearings were held in the State House, Trenton, on October 4 and October 18, 1916. The City of Rahway and the Elizabethtown Water Company opposed the granting of the application. On November 27, 1916, the application was approved subject to the standard conditions and the following:

The approval hereby given is limited to supplying the territory included within the present limits of Linden Township, and to diverting only such water as shall not be necessary for the present or future needs of the City of Rahway as they may arise, provided that the maximum diversion from the Rahway River under this application and approval thereof shall not exceed an average of 3 million gallons per diem for any period of 30 successive days, with privilege to the applicant to petition for an increase in said amount.

Certiorari proceedings (to review the action of the Board) were instituted in behalf of the City of Rahway and of the Wheatena Company, on January 24, 1917, and, on hearing, the approval of the Board was set aside on the ground of irregularity in procedure.

Formal acceptance of the terms and conditions imposed was filed with the Board on February 26, 1917.

West Monmouth Water Company.—Application for permission to divert water from wells was filed September 30, 1916, by the West Monmouth Water Company, of Farmingdale, for the purpose of supplying water to the Borough of Farmingdale, Monmouth County. A public hearing was held in the State House, Trenton, on November 1, 1916. There were no objections. The application was approved on November 1, 1916, subject to the standard conditions. The grant was accepted and work commenced as required.

West Monmouth Water Company.—On September 30, 1916, the West Monmouth Water Company, of Farmingdale, applied for permission to divert sub-surface water to supply the Borough of Englishtown, Monmouth County. After a public hearing on November 1, 1916, at which there was no opposition, the application was approved on the same date, subject to the standard conditions. Formal acceptance of the terms imposed was filed, and work was commenced as required.

North Jersey District Water-Supply Commission.—An application for permission to divert water from the Wanaque River for water-supply by the construction of a storage reservoir upon said river at or near Midvale, Pompton, Passaic County, was filed October 9, 1916, by the North Jersey District Water-Supply Commission on behalf of the Mayors and Common Councils of the cities of Newark and Paterson, and of such other municipalities as may join in the proposed development of a water-supply from said river. A public hearing was held in the City Hall, Newark, November 13, 1916. The Society for Promoting Useful Manufactures, and subsidiary interests, the Morris Canal and Banking Company, and Lehigh Valley Railroad Company opposed the approval of the application. Additional testimony was taken and reported by a Committee to the Board at a later date. On December 19, 1916, the application was approved, subject to the standard conditions and the following special terms and conditions:

The maximum diversion from the Wanaque River authorized by this approval is an average of 50 million gallons per diem for any period of thirty consecutive days.

The dry season flow of the Wanaque River below the dam must at all times be maintained at a minimum of 12 million gallons per diem.

A writ of certiorari on the application of the Society for Promoting Useful Manufactures was granted on January 17, 1917, and the action of the Board sustained by the Supreme Court. An appeal has been taken to the Court of Errors and Appeals and is now pending.

Acceptance of the terms imposed was filed in due course. Commencement of the work has been prevented by the litigation, and necessary extensions of time have been made.

Borough of Ogdensburg.—On November 1, 1916, the Borough of Ogdensburg, County of Sussex, made application for permission to take a new surface water-supply from a small drainage area lying southeast of the Borough. After a public hearing on December 6, 1916, no one appearing in opposition, the application was approved on December 19, 1916, subject to the standard conditions. Formal acceptance was filed with the Board on February 2, 1917.

Elizabethtown Water Company.—On November 13, 1916, the Elizabethtown Water Company made application for permission to divert water from the Rahway River at Florence's Mill Pond, for the purpose of increasing its present source of supply. A public hearing was held in the State House, Trenton, on November 27, 1916. Since this application was for the same supply as that of the Linden Water Company, it was agreed that all testimony offered at the hearing on the application of the Linden Water Company, should be considered by the Board in acting on this application. The approval of the application was opposed by representatives of the City of Rahway, the Linden Water Company, and the Township of Linden.

The application was disapproved by the Board on December 6, 1916, on the ground that the applicant had failed to establish the facts required by statute to be shown.

City of New Brunswick—Highland Park Contract.—Approval of a contract between the City of New Brunswick and the Borough of Highland Park, relating to a renewal of a contract expiring in 1918, whereby New Brunswick furnished water-supply to Highland Park, was requested. After a public hearing on December 6, 1916, at which no objectors appeared, the Board, by resolution, directed its President and Secretary to endorse its approval on the contract duly entered into by the City and Borough, provided said contract when finally executed should be identical in substance and form with the copy filed with this Board. The contract was so endorsed on May 2, 1917.

People's Water Company.—On April 4, 1917, an extension of three months from April 1, 1917, was granted to the People's Water Company, for the commencement of work on its water-supply system at Keansburg, Monmouth County. An additional extension of six months' time from July 1, 1917, was also granted on July 9, 1917. These extensions were made necessary owing to delays in obtaining the approval of the Public Utilities Commission.

Charles N. Evans.—On March 28, 1917, Charles N. Evans, doing business as the Evans Development Water Company, of Lincoln Park, applied for permission to supply water to a part of the Village of Lincoln Park, Pequannock Township, Morris County, from wells on his property. Public hearings were held in the State House, Trenton, on May 2 and October 3, 1917. On the latter date the application was approved with usual conditions.

Borough of Peapack and Gladstone.—On May 24, 1917, the Borough of Peapack and Gladstone, Somerset County, applied for permission to divert additional water from the northwesterly branch of Peapack Brook, in order to sell water to the Gravity Water Supply Company, of

Bernards Township, Somerset County, so that the latter company might supply Far Hills, Bedminster and Pluckemin, and also to certain territory immediately without the limits of the said Borough. A public hearing was held in the State House, Trenton, on June 6, 1917, and on June 27, 1917, the application was approved. Pluckemin was excluded from the area to be supplied and the customary conditions were imposed; also the following:

It is hereby understood and agreed that in the absence of accurate census data, the population figure to be considered in the application of the law regarding excess diversion shall be 1,600, which was the approximate population in 1905 of the Borough and parts of the three townships now to be supplied.

Formal acceptance was filed on July 23, 1917.

Borough of Haledon.—On June 23, 1917, the Borough of Haledon, Passaic County, made application for permission to divert additional water from Oldham Brook for the purpose of supplying water to the Borough of North Haledon, Passaic County. Said application provided for a considerable increase in the existing storage capacity of the system, by using the dam of the present reservoir and constructing a new reservoir immediately upstream from the old one. A public hearing was held on July 9, 1917, there being no objectors. On August 1, 1917, the application was approved subject to the following special conditions:

It is hereby agreed and understood that the population to be considered in the application of the law regarding excess diversion shall be 2,974, being the population in 1905 of North Haledon (697) and Manchester Township (2,277), the latter municipality covering the same area as the present Borough of Haledon, which was incorporated in 1908.

The Borough of Haledon shall agree to let down sufficient water during the dry seasons to maintain the normal dry season flow of Oldham Brook at the point of diversion.

It is further agreed and understood that if at any future date the Borough of Haledon shall enter into contract to supply the Borough of North Haledon with water, said contract shall be subject to the approval of this Board.

City of Perth Amboy.—On September 20, 1917, the City of Perth Amboy, Middlesex County, applied for permission to divert additional water from wells and also take a temporary supply from South River, all in the vicinity of Old Bridge. A public hearing was held on October 3, 1917, and, no opposition being made, the application was approved on the same date, subject to the usual terms and following special conditions:

It is hereby agreed and understood that the diversion of water from South River shall be limited to 10 million gallons daily for a period of one year from the date of this approval; also, that the amount to be diverted from additional storage wells along South River shall be limited to 10 million gallons daily.

This approval is conditioned upon the acquisition by the City of Perth Amboy either of the tract or tracts mentioned in its application as a source of supply or of the right to take water therefrom.

Lincoln Park Water Company.—On September 20, 1917, permission was requested by the Lincoln Park Water Company, Lincoln Park, to supply a part of the Village of Lincoln Park, Pequannock Township, Morris County, from wells. A public hearing was held October 3, 1917, and since there were no objections offered, the application was approved subject to a limitation of 6 thousand gallons per day.

Applications pending.—At the close of the year applications of the City of South Amboy and of the Commonwealth Water Company were pending. The former was for a new sub-surface supply, and the latter for permission to supply the Town of West Orange, Essex County, from wells formerly used as a supply for the Village of South Orange.

EXCESS DIVERSION CHARGES.

Under the provisions of Chapter 252, P. L. 1907, and Chapter 304, P. L. 1910, all municipal corporations, corporations or persons, diverting water either from surface, sub-surface, well or percolating sources, or from a combination of any such sources for water-supply purposes, are required to keep accurate records by meter or other approved methods of the amount of water used, and to report the same quarterly to the Board, as successor of the State Water Supply Commission. For surface supplies Chapter 252, P. L. 1907, makes certain provision for excess diversion charges.

For the year 1916 the Board fixed a rate of $1.00 per million gallons, the minimum rate provided by law. Certification of the amounts due the State were made to the Comptroller according to statute.

The Board also fixed the same rate for the six months' period from July 1 to December 31, 1915, which had not been covered by any action of its predecessor, the State Water Supply Commission, and made certification to the Comptroller of the amounts due the State for this period.

The following tables give data for the corporations using more than the free allowance for the half year ending December 31, 1915, and the year ending December 31, 1916.

EXCESS DIVERSION OF SURFACE WATER, JULY 1-DECEMBER 31, 1915.

SURFACE SUPPLIES	Average daily allowance based on census of 1905, or consumption for year 1907, in gallons.	Average daily consumption for half year ending Dec. 31st, 1915, in gallons.	Average daily excess, in gallons.	Total excess for half year ending Dec. 31st, 1915, in millions of gallons.
Acquackanonk Water Co......	4,356,000	5,550,000	1,194,000	219.69
Burlington, City of............	803,800	845,950	42,150	7.75
East Jersey Water Co.........	7,914,900	14,816,666	6,901,766	1,269.92
Hackensack Water Co.........	21,712,166	25,905,110	4,192,944	771.50
Jersey City, City of..........	38,400,000	47,131,666	8,731,666	1,606.62
Lopatcong Water Co..........	400,000	1,088,750	688,750	126.73
Millville Water Co............	1,188,400	2,201,407	1,013,007	186.39
Newark, City of..............	36,241,666	43,333,330	7,091,664	1,304.87
New Brunswick, City of.......	2,566,371	3,659,120	1,092,749	201,07
Rahway, City of..............	1,521,635	1,628,074	106,439	19.58
Somerville Water Co..........	1,293,335	1,584,321	290,986	53.54
Tintern Manor Water Co....	2,962,600	3,754,809	792,209	145.77
Trenton, City of..............	13,490,000	15,636,666	2,146,666	394.99
COMBINATION SUPPLIES—				
Bound Brook Water Co.......	338,900	450,000	111,100	20.44
Middlesex Water Co...........	1,750,700	3,367,537	1,616,837	297.50
Totals	134,940,473	170,953,406	36,012,933	6,626.36

EXCESS DIVERSION OF SURFACE WATERS, YEAR 1916.

SURFACE SUPPLIES	Average daily allowance based on census of 1905, or consumption, 1907, in gallons.	Average daily consumption for year 1916, in gallons.	Average daily excess, in gallons.	Total excess for year 1916, in millions of gallons.
Acquackanonk Water Co......	4,356,000	6,940,000	2,584,000	945.74
Bridgeton, City of............	1,500,000	1,721,943	221,943	81,23
Burlington Water Dept.......	803,800	945,788	141,988	51,97
Butler Water Co..............	280,000	287,825	7,825	2.86
East Jersey Water Co.........	7,914,900	16,900,000	8,985,100	3,288.55
Gloucester, City of..........	1,500,000	1,681,513	181,513	66.43
Hackensack Water Co.........	21,712,166	25,800,686	4,088,520	1,496.40
Jersey City, City of..........	38,400,000	49,948,000	11,548,000	4,226.57
Lopatcong Water Co..........	400,000	1,072,708	672,708	246.21
Millville Water Co...........	1,188,400	1,897,364	708,964	259.48
Newark, City of..............	36,241,666	47,200,000	10,958,334	4,010.75
New Brunswick, City of......	2,566,371	4,083,739	1,517,368	555.36
Rahway, City of..............	1,521,635	1,757,574	235,939	86.35
Somerville Water Co..........	1,293,335	1,834,113	540,778	197.92
Tintern Manor Water Co......	2,962,600	3,427,350	464,750	170.10
Trenton, City of..............	13,490,000	15,730,833	2,240,833	820.14
COMBINATION SUPPLIES—				
Bound Brook Water Co.......	338,900	433,660	94,760	34.68
Middlesex Water Co...........	1,750,700	4,240,089	2,489,389	911.12
Totals	138,220,473	185,903,185	47,682,712	17,451.86

Appeal of East Jersey Water Company.—On March 17, 1917, the East Jersey Water Company and the Acquackanonk Water Company filed written complaints, as provided for by law, appealing from the charge for excess diversion; the former for the half year ending December 31, 1915, and the year ending December 31, 1916; the latter for the half year ending December 31, 1915. A hearing was held on April 4, 1917, in the State House, Trenton, at which testimony was taken and briefs filed.

The appeals were referred to a committee of the Board, Messrs. Nelson B. Gaskill and Henry Crofut White, for consideration and report. On June 2, 1917, resolutions were adopted denying the appeals. The grounds for the denial are set forth at length in the report of the committee, which was in the form of an opinion, and which was adopted by the Board as voicing its action. The text of the opinion is as follows:

REPORT OF THE COMMITTEE.

Before the Board of Conservation and Development.

In the matter of the Complaints of the East Jersey Water Company and the Acquackanonk Water Company, under Chapter 252, Laws of 1907.

On March 17, 1917, the East Jersey Water Company filed its petition for the cancellation of charges for excess diversion of water for the period ending December 31, 1915, and as well the charges for excess diversion of water during the year ending December 31, 1916, which charges had been calculated and certified by the Department of Conservation and Development to the Comptroller.

At the same time the Acquackanonk Water Company filed a like petition, asking for the cancellation of the charge for excess diversion of water by it for the period ending December 31, 1915.

Upon these two petitions a hearing was duly had before the Board of Conservation and Development, at which time a joint brief was presented and the matter duly argued.

The petitioners concede the correctness of the bills finally rendered as to amount and charge, but each denies the legality of the charges.

On behalf of both petitioners it is alleged that, with reference to the half year ending December 31, 1915, certain provisions of the statute relating to procedure, were so completely disregarded that an exemption has been created. It is alleged and it must be conceded that the State Water-Supply Commission did not certify to the State Comptroller not later than the 15th day of February, 1916, the name of either corporation as owing money to the State for the diversion of water during the preceding year and that the State Comptroller did not promptly notify each company of its indebtedness to the State therefor on or shortly after the

15th day of February, 1916; that therefore it became impossible for either petitioner, on or before the 1st day of July, 1916, to pay the amount so charged, and likewise, the certification of non-payment by the State Comptroller to the Attorney General for immediate steps to collect the same, during the year 1916, failed and the complainants allege that they have been deprived of the benefit of the provision giving any party aggrieved, upon filing written complaint on or before March 20, a hearing upon the merits of the charge. It is also alleged that the act regards annual payments and that the whole machinery of the act is based on that supposition.

The Board of Conservation and Development succeeded to the powers and functions of the State Water-Supply Commission on the 1st day of July, 1916. None of the acts necessary to the assessment and collection of these particular charges for excess diversion for the period ending December 31, 1915, had been performed by the predecessor of the Conservation and Development Commission when the latter commission assumed, under the statute, the functions previously committed to the State Water-Supply Commission, nor was it able to estimate a rate for excess diversion and assess the charges for the half year ending December 31, 1915, until February, 1917, when exhibit "A", the certification of charges, was delivered to the Comptroller, followed by a corrected certification of March 9, producing from the Comptroller the requests for payment, marked respectively Exhibits "A" and "B" in February and March,

On behalf of both petitioners it is argued that the provisions which were disregarded, are not directory but are in fact mandatory, and that the intent to make compliance with these provisions an essential requisite to the exercise of the authority to assess and collect charges for excess water diversion, is to be found in the statute.

The act in question is evidently put forth in the exercise of the police powers of the State. The State Water-Supply Commission was created and charged with a general supervision over "all the sources of potable and public water supply, to the end that the same may be economically and prudently developed for the use of the people of the State." The charge for excess diversion is stated by the statute to be a license, for the evident purpose of distinguishing it from a tax. The grant of power, therefore, to the Water-Supply Commission, continued to the Board of Conservation and Development, is a grant of a part of the State sovereignty, to be exercised by the designated agent in the interests of the welfare of the whole sovereignty. Such a grant is clearly to be distinguished from those lesser grants which are in fact derogations of authority in which the powers conferred are to be exercised for the benefit of something less than the entire sovereignty. In these latter cases all conditions, limitations and rules of procedure must be strictly followed and it is to such cases that the authorities cited by the petitioners have application. A power put forward to be exercised by a State agency of administration in the interests of the State at large, is restricted only by the principle that the agency can exercise no greater power than has been conferred upon it by the creating statute, and since it is supposed to be acting constantly in the interests of the public, these interests are protected by the rule that the public welfare cannot be impeded by the negligence or default of the public agent.

The statute itself creates the liability for the payment of charges for excess diversion of water when calculated. The process of calculation and the various stages of certification and collection are clearly separate from the origin of liability. The charge is imposed by the determination of amount and the certification and subsequent notification. The act of diverting water in excess of a determinable amount, creates a continuous liability to pay the charges when determined. The right to divert water is in itself a grant of the State's power over the water supply. The exercise of this power gives rise to the liability. The act of the Commission in calculating the amount of the charge is the imposition of the charge. This was the principle laid down in State vs. United New Jersey Railroad and Canal Company, 76 N. J. L. 76. It is quite true that the statute contemplates that the amount of license fee shall be fixed annually and be paid annually but this is quite as much for the purpose of making a calculation of the amount of the license fee possible as for any other reason. In face of the clearly created liability to payment, arising under the statute from the fact of excess diversion, we cannot concede that the failure of the State Water-Supply Commission to adhere to the statutory procedure, creates an exemption which the statute itself does not contemplate.

No harm has been done the complainants. They have had due notice of a charge imposed, without penalties, and they have not been deprived of the right of hearing.

The East Jersey Water Company further asserts, in its particular behalf, that it should not be compelled to pay any license fee for the excess diversion of water for the period ending December 31, 1915, upon the principle of res judicata. In this connection it is alleged that similar charges for the years ending June 30, 1908, June 30, 1910, June 30, 1911, June 30, 1912, June 30, 1913, and June 30, 1914, were cancelled by the State Water-Supply Commission upon the grounds just considered and it is argued that this cancellation presents an estoppel in the nature of a judicial determination in a court of competent jurisdiction, between the same parties in a cause involving the same subject matter.

We decline to assent to the view that the action taken by the State Water-Supply Commission now prevents this Board from asserting, on behalf of the State, its right to collect the charges assessed for the period ending December 31, 1915, and the year 1916.

The petitioner, the East Jersey Water Company, with reference to the charges against it both for the half-year of 1915 and the full year of 1916, asserts its immunity from payment and argues that the charges against it should be cancelled because, as the facts appear to be, prior to June 17, 1907, when the act came into force, the petitioner was under contract to supply certain municipalities with water; that in order to carry out these contracts it had erected a plant at Little Falls capable of supplying sixty-five million gallons of water per day and acquired the right to divert that quantity of water per day, all prior to June 17, 1907. The petitioner asserts that, by reason of those contracts and the erection of its plant, the municipalities with which it was under contract had then a vested right to receive from it a supply equal to the needs of their requirements present or future, to the full capacity of its plant. The petitioner then brings forward the opinion of the then Attorney General of this State, a copy of which is attached to its brief, in which opinion, with reference to the facts above stated, the language of the act imposing charge for excess diversion "for all such water hereafter diverted in excess of the amount being legally diverted," is construed. The opinion results in the proposition that, because the petitioner had, prior to the time when the act went into effect, a right to divert sixty-five million gallons per day, that it was legally diverting that amount of water per day within the contemplation of the statute, when the act went into effect, although it is conceded in the opinion referred to that the actual diversion was, at the time when the act went into effect, much less. It was so much less in fact that the petitioner concedes the amount of the charge for excess diversion now presented to be correct, if the liability for payment be established.

We find ourselves unable to accept the conclusion reached and stated in this opinion. To us the phrase "the amount being legally diverted," which refers to the time when the act became effective, is at least capable of two interpretations; the one now insisted upon by the petitioner, which results in the establishment of the right in the petitioner to divert water without charge to the extent of sixty-five million gallons per day, thereby depriving the State of such an annual income of $2,861.49, and in presenting to the petitioner the gratuitous use of 2,861.49 million gallons of water annually. The alternative interpretation is that which the language of the statute in its most ordinary and accepted meaning would seem to indicate, namely, that the amount which was being actually and legally diverted at the time the act went into effect should not be subject to charge, but that any excess over that amount thereafter diverted should be subject to charge.

This seems to be the proposition stated by Vice-Chancellor Stevens, in Wilson, Attorney General, vs. East Jersey Water Company, 83 N. J. Eq. 42-45, when he says, "No actual diversion can take place except as the municipality uses the water," which in our judgment is a declaration that "diversion" and "use" are equivalent terms.

We cannot accede to the proposition that the legislative intent, as read from the language used, was to create an exemption beyond the then present actual use. Whether the legislature had any or no knowledge of the extent of the right of diversion which the petitioner had secured by its negotiations with the riparian owner, from whom it secured its water rights, is not to be presumed. That the legislature intended to deal with the possibilities of contractual rights existing at the time the act became effective, likewise may not be presumed. The more reasonable interpretation is that the legislature contemplated the exemption of that quantity which was then in use under lawful right, and the charge for excess diversion thereafter.

This interpretation of the statute, which appeals to us as the more reasonable and which we have therefore adopted, finds support also in the common law rule that everything for the benefit of the king shall be taken largely, as everything against the king shall be taken strictly (Cited in the footnote to Trustees for the Support of Public Schools v. Trenton, 30 Eq. 667.) The sovereignty of the State is the successor of the sovereignty of the king and, except in so far as these common law principles dealing with State sovereignty have been abrogated by legislative enactment, they are still in force. The intent of the statute, therefore, is to be taken largely in favor of the sovereignty and the possibility of exemption to the petitioners is to be taken strictly.

The result is that the requests of the petitioners for cancellation of the charges for the period ending December 31, 1915, and for the year ending December 31, 1916, are denied.

The East Jersey Water Company promptly obtained a writ of certiorari to review this decision and at the close of the year the case is still pending.

PLANS FOR DAMS.

Rules.—According to Chapter 243, P. L. 1912, as amended by Chapter 107, P. L. 1913, no corporation or person shall erect any dam or alter any existing dam in this State or between this and any other State without the consent and approval of the Board of Conservation and Development, as successor to the State Water-Supply Commission. Certain classes of low dams are exempt. The Board has adopted the following rules governing the submission of plans and specifications under this law.

1. All drawings must be clear and distinct and must include:

   a. One or more elevations of the structure.
   b. A complete cross section transverse to the axis of the structure through the spillway and a corresponding cross section through the wings.
   c. Elevations and cross sections may be shown together insofar as they do not obscure each other, but must not be commingled in the same drawing. Where a structure is symmetrical about a center line, one-half of the drawing may be in elevation and one-half in section. Steel reinforcement must be shown on the sections only.
   d. There must be a plan of the complete structure, including the wings back to the solid banks on either side.

2. The drawings, or a description accompanying the same, must clearly set forth the nature of the foundations and of the banks into which the structure is to be built, and also what precautions are to be taken by way of sheet piling or core-walls to prevent the percolation of water beneath or around the wings of the structure. In all cases where the head of water against the dam exceeds 10 feet, it must either be specified that such sheeting on core-wall is to extend to solid rock or other impervious material, or otherwise the nature of the material must be determined by core borings to rock or other impervious material, samples of which must be submitted.

3. The exact location of the dam must be indicated upon one of the official maps of this Department (formerly the State Geological Survey), and the engineer must submit his measurement of catchment area and his basis of calculation for the dimensions of the spillway.

4. Complete specifications covering the materials and workmanship must be submitted.

5. Drawings must not exceed 30 inches in width, but may be any length.

6. The title shall be placed in the lower right hand corner of the plans, and shall specify (a) the name (if any) and appropriate location of the dam; (b) name and address of the owner; (c) name and address of the designing engineer; (d) scale of drawings; (e) date.

Borough of Ogdensburg.—Plans were approved February 7, 1917, for the construction of a dam on a small tributary of the Wallkill River for water-supply purposes. Owing to change of source of supply, the dam will not be constructed.

Haddon Lake Land Company.—Plans for the construction of a reinforced concrete tumbling dam and bridge, by the Haddon Lake Land Company, on the South Branch of Newton Creek, in Center Township, Camden County, were approved March 7, 1917, after modifications to meet requirements of safety imposed by the consulting engineer of the

Department. This structure will raise the water of the creek about 12 feet above its normal level.

City of Newark.—Plans and specifications for raising the dam of the Oak Ridge Reservoir on the Pequannock River were filed by the City of Newark on March 30, 1917. The plans provide for raising the existing structure 10 feet, so that the maximum height will be about 60 feet and the total length between banks 1275 feet. The present dam is an earth embankment with concrete core-wall, spillway, etc. Upon the recommendation of the consulting engineer of the Department, the Board approved the plans of April 4, 1917. The contract for the construction was let in May, 1917.

Borough of Haledon.—Plans for the erection of a dam on Oldham Brook, about 2 miles north of the Borough of Haledon in Passaic County, for water-supply purposes, were filed on June 23, 1917. These plans provide for the construction of an earth embankment and concrete core-wall having a total length of 740 feet and a maximum height above the stream bed of 26 feet. The dam will impound 214 million gallons of water. After slight modification of the plans the approval of the Board was given on August 1, 1917.

Plans were also submitted at the same time for raising the dam of the existing reservoir, located about 1000 feet downstream from the site of the proposed dam. The existing dam consists of an earth fill with puddled embankment on upstream side, having a maximum height of 12 feet above the stream bed and a total length of 320 feet. The proposed alterations raise the flow line of reservoir 4 feet, and increase the storage capacity from 7 to 15 million gallons. The plans, after minor changes, were approved on August 1, 1917.

Montclair Boy Scouts' Association.—Plans for a dam, consisting of an earth and rock fill with concrete core-wall, were filed by the Boy Scouts' Association of Montclair on June 8, 1917. It is 220 feet long with a maximum height of about 25 feet above the bed of the brook. The dam is about 2½ miles north of Oakland, Bergen County, on a small stream about a mile above its junction with Ramapo River. After modifications to meet the requirements of the Department, the plans were approved on August 1, 1917. Construction work is in progress and three inspections of the work have been made.

Hohokus Bleachery Company.—On September 6, 1917, the Hohokus Bleachery Company, Hohokus, filed plans for the repair of a dam on Hohokus Creek, near Hohokus, Bergen County. The structure consists of a masonry section about 13 feet high and 130 feet long connected to either bank by earth fills 107 and 149 feet long. The masonry section, which acts as the spillway, was reinforced by buttress and an underpinning apron of concrete. Plans for this work were approved September 12, 1917, and three inspections of the construction work have been made.

City of New Brunswick.—Plans for the construction of a concrete arch dam on Lawrence Brook, a short distance above Weston Mills dam, were submitted by the City of New Brunswick to the State Water-Supply Commission, and the same were approved on March 28, 1916. The structure consists of a concrete arch 200 feet long and a maximum height of 22½ feet above rock. The contract for construction work was let and work commenced during the past summer. An inspection of the work was made on October 15, 1917.

Pending Application.—The Glenwild Lake Company, Butler, Morris County, filed plans on October 9, 1917, for a dam to be constructed on Mud Brook, a small tributary to the Wanaque River, at a point about one mile north of Bloomingdale, Passaic County. The structure will be a combination of a concrete masonry section and an earth fill with rubble masonry core-wall, having a total length between banks of 670 feet, and a maximum height above the stream bed of 17 feet. An inspection of the site was made on October 25, 1917, and certain minor alterations in plans were agreed to by the applicant. Formal action on the matter had not been taken before the close of the fiscal year.

INVESTIGATIONS OF GROUND WATERS.

Collection of well data.—Additional well logs have been collected and recorded, the data being obtained both by correspondence and by personal visit, and the Department now has records of over 1,500 deep wells drilled in all parts of the State. Well drillers and others are urged to communicate with Dr. M. W. Twitchell, Assistant State Geologist, regarding all new deep borings of this character, this work being in his immediate charge.

Reports.—At the request of the Director of the United States Geological Survey, Dr. Twitchell prepared a summary report on the underground waters of the New Jersey Coastal Plain, for the use of the War Department at Washington, D. C.

Reports were also made to the Quartermaster General, regarding groundwater conditions at Camp Dix near Wrightstown, preparatory to its acquisition by the Government as a cantonment.

Dr. Twitchell has also continued his work upon the manuscript of a detailed report on the groundwaters of the State.

Not a few letters are received from well drillers and others regarding the occurrence of groundwater at specified localities. It is the policy of the Department to answer these as fully and in as much detail as the facts in hand warrant. No line of work has a more direct practical bearing than this.

Report of the State Museum.

HELEN C. PERRY, *Curator.*

Reorganization of the State Museum.—The first two months of the fiscal year, November and December, were spent in completing the work, started during the summer, of redecorating the Museum, remodelling the cases and equipment, and rearranging the exhibits. Previous to this all the old exhibition material had been carefully gone over, cleaned, catalogued, and stored where it was easily accessible, and duplicate specimens had been lent to schools throughout the State. Owing to lack of space it was impossible to show all the accumulated material in the Museum at one time, so a careful selection of the best natural history specimens was made, a number of industrial process exhibits were obtained from manufacturers and the geological specimens were arranged in a more popular way. These exhibits were simply and clearly labelled, and so displayed as to be representative in a small way of the many different lines of interest which should be developed in a State Museum.

Opening of the reorganized Museum.—The reorganized State Museum was opened to the public on January 1, 1917. The following changes had been made. The woodwork of the room and the cases was finished in a warm pastel gray with the walls a paler shade. The cases were lined with gray monk's cloth, making a soft-colored neutral background for exhibits. All exhibits were mounted invisibly or on glass shelves, and glass tops to the cases let in the light from above. In the center of the room was a large reading table. The rest of the room was made as attractive as possible by rugs, tapestries, and pottery, all presented by New Jersey manufacturers.

Permanent exhibits.—The following exhibits were given a permanent place in the Museum, altho they may occasionally be exchanged for others.

Natural History.—Queer Fish, Food Fish, Bird Homes, How Birds get their Food, Common Birds of Trenton Classified According to Color, Ducks of New Jersey, Warblers of New Jersey, Herons and Bitterns of New Jersey, Turtles and Snakes, Animals of New Jersey, Animals and their Young.

Industries.—Wool, Silk, Flax, Cotton, Pottery, Tiles, Brick, Sanitary Ware, Rubber, Zinc, Iron and Steel, Copper.

Geology.—Useful Minerals and Rocks, Minerals and Rocks of Trenton and Vicinity, Structural Features of Rocks, Fossils, Common Rocks, Common Rock-Forming Minerals, Properties of Minerals, Road Materials, Building Stones, Sand and Clays of New Jersey.

Pictures.—The Museum has purchased a set of one hundred original water color sketches of New Jersey wild flowers, by Miss Caroline Fox of Germantown, Pa.

Special exhibits.—The Museum held a number of special exhibits during the year, some of them representing the work of various State departments, and some of them only of local interest. These exhibits were partly in the line of experiment, to see which appealed most to the schools and the public, and what class of people was attracted by each. It is hoped that a little later each of these special exhibits may be so arranged on charts and screens that, after being shown in the Museum, it may be easily shipped to other cities and community centers, and form one of a series of travelling exhibits. Following are the special exhibits held during 1917:

		Attendance.
January 1-27:	School of Industrial Arts—Trenton	2430
February 1-24:	State Institution for the Feeble-Minded—Vineland	2869
February 26-March 15:	New Jersey State Commission for the Blind	4174
March 19-April 4:	Making of a Newspaper. False Weights and Measures. Patent Medicines. Forest Fire Posters. Finger Work of Blind Babies	1509
April 9-May 9:	Homelands Exhibit	4726
May 14-June 2:	Wild Flower Exhibit (Including Water Color Sketches)	2917
June 4-27:	School Art Exhibit	1294

September 24-29:	
Exhibit of Museum Collections at State Fair	
October 1-31:	
Red Cross and Military Exhibit	2535

The exhibition by the School of Industrial Arts included handicrafts of various sorts, such as pottery, jewelry, metal-work, china, modelling, woodworking, as well as sketches, posters and paintings.

The exhibition of the New Jersey State Institution for Feebleminded Women, consisted of forty or fifty charts, and a large display of the handiwork of the patients themselves, such as handweaving, basketry, embroidery, etc. This was of special interest to teachers of psychology and classes in the normal schools.

The exhibition of the New Jersey State Commission for the Blind included a splendid exhibit of articles made by the blind, such as handweaving, basketry, knitting, crocheting, and plain sewing. In addition, for the first three days of each week, the blind themselves gave demonstrations of their handiwork in the Museum. This exhibit lasted only a little over two weeks, but the demonstrations attracted the largest crowds the Museum has had.

The exhibit, the Making of a Newspaper, was presented by the *Trenton Times.* The exhibit of False Weights and Measures was lent by the State Department of Weights and Measures. The Patent Medicine exhibit was a series of charts, lent by the State Department of Health. The exhibit of Forest Fire Posters was lent by the Forestry Division, and the Finger Work of Blind Babies came from the Blind Babies' Home in Summit.

The Homelands exhibit attracted much interest, as it was collected by school children, and consisted of craftswork brought by their parents from their native lands in Europe. Nineteen schools gave preliminary exhibits to which their parents were invited, and the articles to be shown at the Museum were selected from these smaller exhibits. Among the objects displayed were pottery, metal work, embroideries, hand-woven articles, etc. During this exhibit the Museum had an Italian evening and a Hungarian evening which were largely attended.

The Wild Flower exhibit was prepared by Miss Margaret Widmann, with the help of some of the nature-study teachers of Trenton. The flowers were brought in fresh every day, and Miss Widmann lectured to school classes about them. Over two hundred specimens were shown in all.

The School Art exhibit was assembled by the State Department of Public Instruction. It included representative art work from schools throughout the State. The same exhibit was shown later in Ocean City.

The exhibit at the State Fair occupied the small cabin belonging to the Department and was a part of its general exhibit. It included a display of the lending collections now being prepared by the Museum, and a part of the Red Cross exhibit, as being representative of our special exhibits. In addition there were daily demonstrations by members of the Red Cross, and by the blind of the New Jersey State Commission.

The Red Cross exhibit was assembled by the Trenton Chapter of the American Red Cross and consisted of samples of all the articles made by them.

The Military exhibit was lent by the Quartermaster General's Department, and showed the arms, uniform, and equipment of a soldier during the Revolution, the War of 1812, the Civil War, the Spanish-American War and the present great war.

Local school work.—Museum has been open ten months. Seven of them have been school months, and during that time 250 classes or 6,278 pupils have visited it to study either permanent or special exhibits. Each school in Trenton and vicinity, at the reqest of the Museum, has appointed a museum representative. Monthly bulletins announcing current exhibits are sent to principals and museum representatives of public, parochial, and private schools, and the representatives are called together for occasional conference on matters pertaining to both schools and the Museum. The cooperation of the schools has been splendid. Classes are allowed to visit the Museum during school hours. The Homelands exhibit was collected entirely by the children, and preliminary exhibits were held in nineteen schools. Manual-training boys prepared the wood exhibits, nature-study teachers helped with the Wild Flower exhibition, the Trenton State Normal School prepared fifty lending sets of butterflies and insects in Riker mounts, and many other schools have helped in various ways. A little later, the Museum plans to have a daily children's hour, at which time trained students from the State Normal School will tell stories about objects in the Museum, or the children will be taught to play the museum observation game.

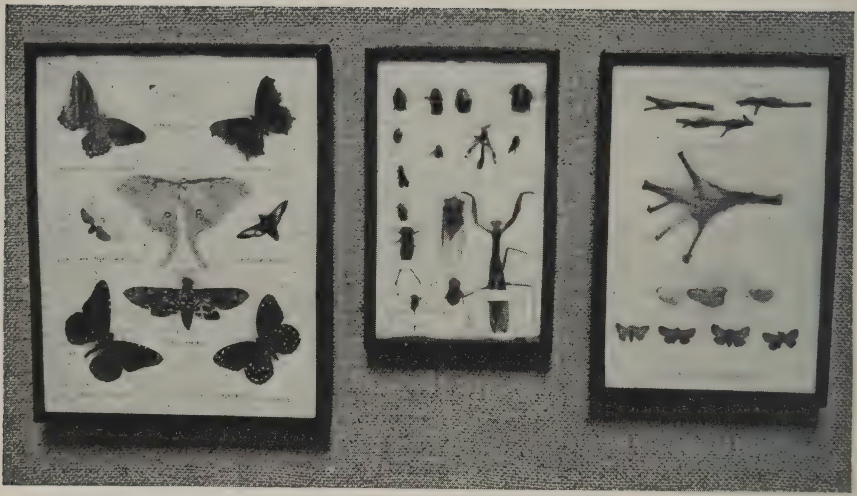

Fig. 6. Insects in Riker Mounts for Study in the Public Schools.

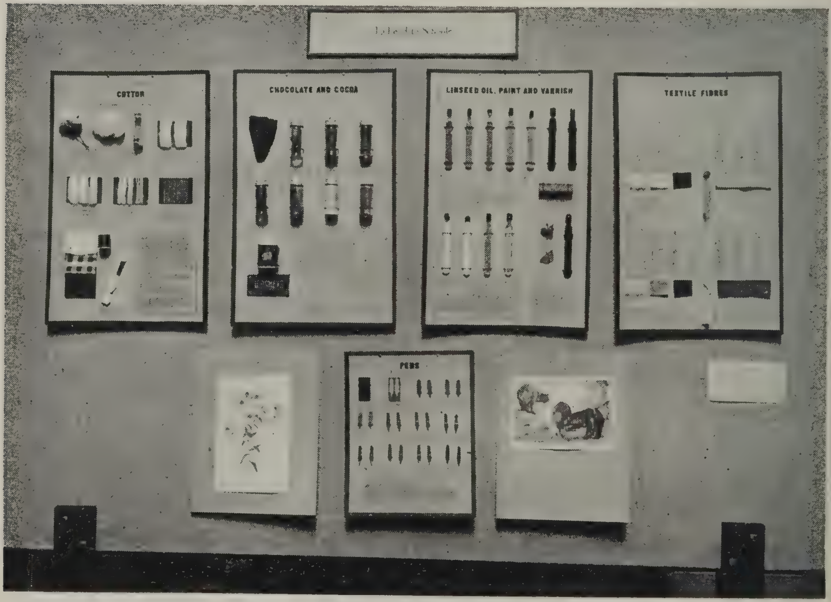

Fig. 7. Charts Illustrating Manufacturing Processes Prepared for School Use.

SOME OF THE MATERIAL PREPARED IN THE STATE MUSEUM TO BE USED IN SCHOOL WORK.

Loan collections.—The Museum is arranging loan collections to send out to schools of the State. During the past year thirty old cabinets containing duplicate natural history specimens have been lent, and many more were asked for. This fall nearly three hundred industrial process charts have been prepared, on the following subjects: Silk, wool, cotton, flax, textile, fibres, rubber, cork, asbestos, paint and varnish, cereals, flour, chocolate and cocoa, pottery, shears, spoons, pens and pencils. Other industrial, forestry, and geological sets are in the course of preparation. The material has all been given by manufacturers. Besides the sets of butterflies and insects in Riker mounts, the Museum has a large collection of mounted, colored pictures of birds, animals, fish, insects, trees, flowers, fruits, and minerals. These loan collections are all in standard sizes and can be easily packed in convenient shipping cases. Any school in the State may order a selected set, to contain not more than four charts and Riker mounts or ten pictures, keep it a month, return it, and exchange it for other material, as books are borrowed from a library. In this way comparatively few exhibits may reach a great number of schools. As soon as the funds are available, the Museum plans to make up study sets of four or five typical birds or small mammals to lend in the same way. Many Museums are lending teaching materials to local schools, but so far as we know, this is the first one to lend them on so large a scale throughout the State. It is, therefore, largely an experiment and thanks are due the Department of Public Instruction, the State Normal School, and Mr. John Cotton Dana and Miss Louise Connolly of the Newark Museum for their cooperation with this Museum in the working out of a satisfactory lending system.

Lantern slides.—The Museum has over 4,000 lantern slides which it lends to schools of the State. The catalogue was published in February, and since that date to November, 85 orders, or 2,939 slides have been sent out, and the demand for them is constantly increasing.

Other work.—Since January 1, the Museum has been open daily, except Sundays, including Saturday afternoons and all holidays except July 4. The plan of keeping open Saturday afternoons and holidays was started as an experiment and has been continued because of the large attendance on those days. It has also been open eighteen evenings; on Monday evenings during the session of the legislature, and on other evenings to accommodate special organizations. Aside from school classes, nineteen organizations have visited it, including boy scouts, campfire girls, science clubs, classes from the International Institute, department store clerks, etc. Eleven talks and lectures have been arranged for or given by a representative of the Museum. Every effort has been made to cooperate in any possible way with individuals, schools, or organizations asking for information or help from the Museum.

Attendance.—The attendance by months shows an interesting increase during the special exhibits held in the spring, a corresponding falling off during the hot summer months, when school was not in session and there were no special exhibits, and an increase again with the beginning of fall activities.

Month	No. of classes	No. of pupils	Total attendance
January	17	351	2,912
February	24	509	3,764
March	44	1,285	4,657
April	54	1,428	3,715
May	61	1,539	4,381
June	15	332	1,494
July	..	....	947
August	..	....	1,688
September	5	82	1,929
October	30	752	2,535
Totals	250	6,278	28,022

The average attendance has been as follows:

Per day	109
Per week	637
Per month	2,802

Total attendance for the 10 months' period, 28,022.

The largest attendance for any one day was 846, on March 7, the last day of demonstrations of the exhibit of the New Jersey State Commission for the Blind. On this day there were 17 school classes, totaling 417 pupils.

Report of the State Forester.

ALFRED GASKILL.

The work of the Division of Forestry and Parks has gone forward on lines heretofore laid down, with some interruption through the withdrawal of men for military service, and with some increase of activity in certain directions to meet emergency conditions. One who goes about the forested sections of the State cannot fail to notice the improving condition of the woodlands, and here and there indications of the practice of silviculture. Most of the improvement can be attributed to fire control, and it is reasonable to expect that the forests will be cared for by their owners in direct proportion to the degree of fire protection accorded. The collateral interest of Shade Trees—which is *not* forestry, is actively supported.

Assistance to woodlot owners is given, forest planting is directed wherever that is advisable and the owner of the property is ready to undertake the necessary outlay. There is, however, no reason to advocate forest planting on any large scale, as is done in some states. As a whole New Jersey must have less forest rather than more. Our task is to establish and maintain productive forests on true forest soils, and to give over forests that occupy land available for agriculture.

Markets.—The difficulty of marketing forest products found, as is almost universally the case in this State, widely distributed and in comparatively small quantity, operates to discover many owners who actually wish to do the right thing by their woodlands. The problem is no less difficult of solution than that of marketing farm products. The Department now has fairly complete lists of those who buy forest products in various forms and, except in the case of cordwood, can usually direct to a purchaser anyone who has timber to sell.

Cordwood.—To dispose of fuel wood is, and always has been, difficult in most parts of the country. In normal times cordwood cannot be sold except in limited quantities or within a comparatively short distance of the place of production. The war emergency, however, seems to open an opportunity for the increased use of wood fuel instead of coal, especially by farmers and in industries within teaming distance of the forested sections. A special bulletin on this subject was issued in November.

FOREST FIRES.

The report of the State Firewarden gives in detail the result of the State's effort to give value to forest property through fire protection. Few people, within or without our borders, realize the magnitude of the task. It is not simply to put out the fires that occur, but to educate a whole population, including many foreigners, to guard nearly two million acres of woodland, and to induce habits of care with respect to fire in the place of habits of carelessness or indifference. The Forest Fire Service is effective far beyond what would be expected when its low cost is considered. There is ample room for improvement and nothing lacking but money to extend the present organization along lines already tried out.

Though the year has been a trying one, there is much satisfaction in the record. For one thing, no fire can burn for more than a few hours in any part of the State without engaging the attention of a firewarden; for another, the deer hunters have been brought to respect the law and in very many cases to be careful with their smoking material; for a third, smokers in general are learning that upon them rests responsibility for many forest fires.

The net result is that the forests of the State, without regard to ownership, are generally in better condition than ever before; in many sections they are taking on positive value; an increased acreage is under silvicultural management. We shall have forestry, practiced by many private owners as well as by the State, when we have adequate fire control. There can be no forestry without it.

STATE FORESTS.

During the year only two small fires have occurred on the 15,000 acres of State Forest and their condition is steadily improving. These properties are not reserved in any sense, but are maintained for the public as demonstrations in practical forestry and as recreation grounds. The Stokes Forest in Sussex County is particularly well adapted to the latter use and this year has been put in charge of a professional forester, who lives upon it, has had a good road connecting headquarters with the county highway through Culvers Gap, and has been provided with about eight miles of easily traversed trail running along the crest of the Kittatinny mountain. This trail is maintained to serve pedestrians; it affords a means of reaching the highest land in the State and overlooking the most attractive section of New Jersey and adjacent portions of Pennsylvania and New York. By laterals from this crest trail the headquarters station, the forester's cabin and several springs of pure water are easily reached. The value of this property as a State park has never been appreciated and the Department will continue its efforts to secure the needful money, or the labor of prisoners, to make it more accessible and more attractive.

The only acquisition is an aggregate of 307 acres acquired under condemnation proceedings and added to Stokes Forest.

STATE FORESTS.

Bass River Forest—Warden, Samuel Budd Allen, New Gretna, 1,634 acres
Is in Burlington County, six miles northwest of Tuckerton, and is typical of the so-called "pine barrens." A considerable number of experimental plantations and several well developed experimental thinnings are on it.

Jackson Forest.—Warden, Charles H. Thompson, Cassville, 43 acres.
Is in Ocean County, 10 miles west of Lakewood on the New Egypt road, and carries a forest of nearly pure pine about 35 years old. It is used to demonstrate the methods of practical forestry and as a resting place for travelers.

Lebanon Forest.—Warden, Victor Bush, Pemberton................ 3,620 acres.
Is in Burlington County, nine miles southeast of Pemberton, and contains pine, oak and cedar. Several experi-

mental plantations and more recent thinnings are on it, but it is used largely as a demonstration in fire control under particularly difficult conditions. Considerable fire damage has been suffered since the acquisition of the property, but it is in better condition in every way than when it was acquired. A portion of the area is under agricultural development by the State Colony for Feeble-Minded Males at Four-Mile.

Mount Laurel Forest.—Warden, Harvey Darnell, Moorestown, 20 acres.
Is an isolated tract of hardwood and pine in Burlington County, three miles southeast of Moorestown. It is peculiarly accessible and susceptible to forest management, and because of very complete and successful thinning and plantings six years ago, has unusual value as an example of applied forestry. (See fig. 8.)

Penn Forest.—Warden, George L. Inman, Chatsworth............ 2,764 acres.
Is in Burlington County, six miles southeast of Chatsworth. It is a tract of almost pure pine in the heart of the wilderness. The forest or much of it is in better than average condition and affords a pointed example of the value of fire protection in developing timber growth under typical conditions in "The Pines."

E. C. Stokes Forest.—Forest Ranger, H. Milton Stults, P. O. Branchville.. 7,036 acres.
Is in Sussex County, two and a half miles west of Branchville. It is typical of absolute forest land in North Jersey. Under fire protection it is rapidly developing in value, and it has great possibilities as a park. Roads, trails, and camping sites are being provided as fast as facilities permit. Through recent additions the forest is now easily accessible from the highway in Culver's Gap.

Swartswood Lake.—Forest Ranger, H. Milton Stults, P. O. Branchville .... 560 acres.
Is in Sussex County, seven miles northwest of Newton. It consists of Swartswood Lake, with an area of 544 acres, and eight adjacent pieces of upland embracing 16 acres. It is maintained for the use of the public as a park and recreation spot.

Total ....15,677 acres.

State colonies.—The colony for Feeble-Minded Males, established in 1914 on the Lebanon Forest as a Burlington County enterprise, was last year taken over by the State and developed

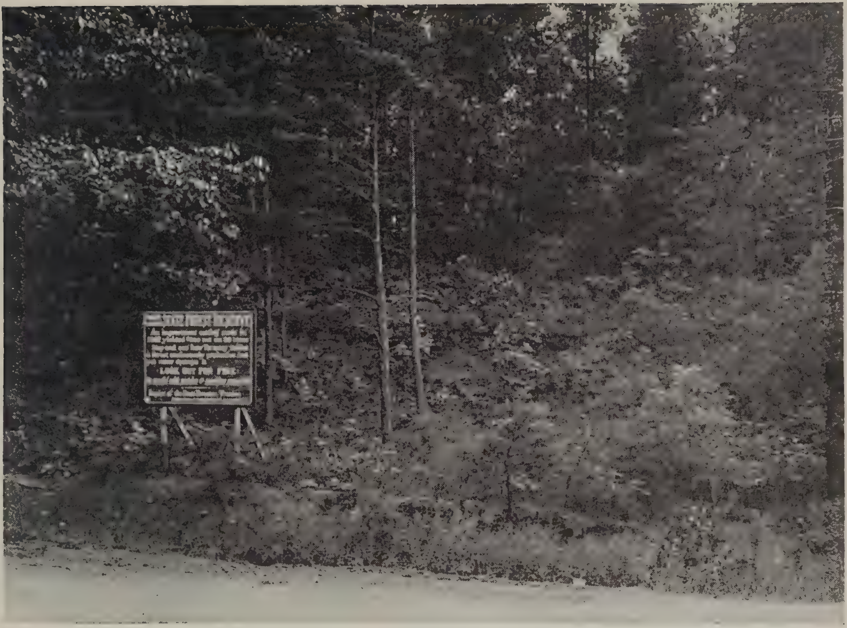

Fig. 8. A Demonstration of Practical Forestry. A Felling in this Forest Made in 1912 Yielded $15.00 an Acre Net. Burlington County.

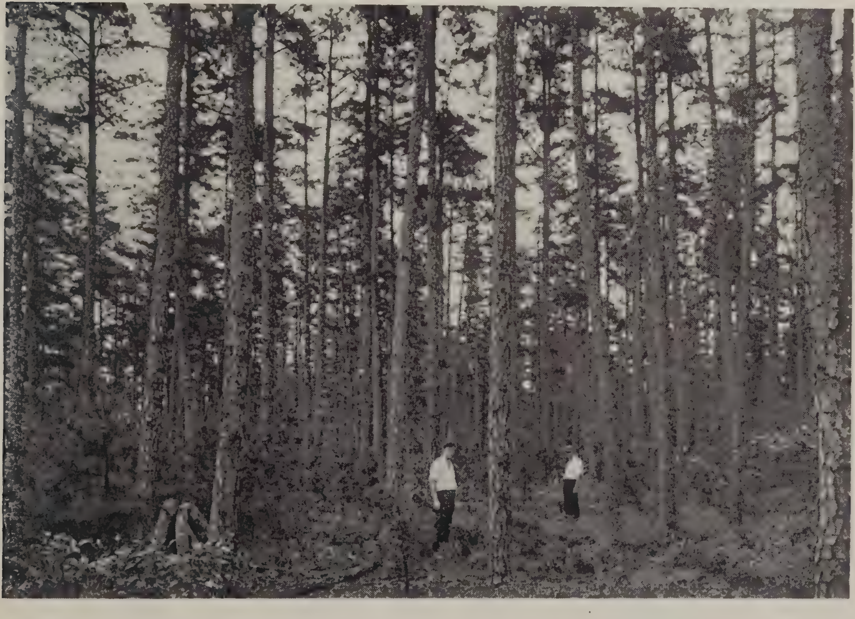

Fig. 9. Mature Stand of Pine with Abundant Reproduction. This Timber Should be Cut Soon. Ocean County.

so that it now accommodates and gives employment to forty-five boys. On Stokes Forest there is a good location for a similar colony to accommodate the unfortunates in the northern section of the State. If such a colony is established the able-bodied defectives can be organized in a working crew which shall improve the forests by systematic cuttings while producing an income to the State from the sale of timber. At least twelve men can be kept constantly employed preparing for market timber that is mature and in condition to be removed.

SHADE TREES.

Shade tree commissions.—The interest in the maintenance of street shade in the State's municipalities is evidenced by the fact that the number of active shade tree commissions has increased to 89, with resources aggregating $283,665, while reports are lacking from 8 others which reported in 1914. A summary of these with their resources and activities is given on page 62. It is notable that too few South Jersey and seashore communities are represented in this list. A shade tree commission represents the idea of co-operation and usually is the most effective means of securing at moderate cost the consideration that is absolutely necessary to every tree standing in an exposed and uncongenial situation. The Department aims to keep in touch with these organizations and is always ready to help them with their problems, so far as it is able. Unfortunately it is still without the means to maintain an arborist who shall devote his time to the service of shade tree commissions and similar interests. Such an appointment will be made as soon as funds are available.

SUMMARY OF SHADE TREE COMMISSIONS IN THE STATE, AND THEIR ACTIVITIES.

Community.	Commission Appointed.	Appropriation 1917.	Lines of Work Followed.	Special Needs.	Executive.
Allendale	1910	$93.50	General park and street tree work	Good street trees	J. W. Rudolph, Chm.
Arlington	1909	2,000.00	Pruning, spraying	Competent help	John Davidson, Pres.
Asbury Park	1913		No information. (2)		
Atlantic City	1913(5)	10,000.00(4)	Planting Park and Pacific Avenue	Trees that will live	J. B. Thompson, Dir.
Audubon	1914	None.	Advisory.	Cooperation of public	I. W. Tatum, Pres.
Bayonne	1915	2,000.00(4)	Trimming, planting, tree surgery	Planting and publicity	E. R. Waldeberger, City Forester.
Belleville	1912	1,250.00	Trimming, planting	More money	
Belmar	1911	None.	Inactive at present	Trimming trees	
Bergenfield	1916	100.00	Planting, trimming		Chas. Demarest, Chm.
Beverly	1912	None.	Inactive.	Public interest	
Bloomfield	1909	3,250.00(4)	Care of 3 parks, and of shade trees and planting	Larger appropriation	H. G. Hendricks, Pres.
Bogota	1911	225.00	Planting and general care of trees	Insect control	J. R. Thompson, Pres.
Bound Brook	1911	450.00	Trimming, planting	Tree surgery	Geo. O. Smalley, Pres.
Bridgeton	1914	None.	Inactive at present		
Caldwell	1910	100.00	Planting and general care		W. B. Gould, Chm.
Carlstadt	1910	180.00	Planting, trimming		Thos. Lohan, Chm.
Chatham	1909	180.70	Planting, spraying, trimming	Properly graded streets for planting	H. DeB. Page, Sec.
Cranford	(6)	500.00	Tree surgery		L. C. Dilks, Chm.
Dover	1912	1,000.00(4)	Excavating lake in park	More money	P. C. Buck, Pres.
East Orange	1904	7,950.00	Planting, general care, tree surgery		E. H. Bennet, Sec.
East Rutherford	1907	282.43	Planting and general care	More parks and money	Wm. H. Lenk, Treas.
Elizabeth	(3)	7,230.00(4)			
Emerson	1915	175.50	Planting.	Street grading and shade trees.	Chapin C. Perry, Pres.
Franklin	1916	300.00	Planting and general care	More money	E. M. Spry, Sec.
Freehold	1916	300.00	Trimming, removing dead trees	More money	F. B. Howell, Pres.
Glen Ridge	1911	1,000.00(4)	Planting, trimming	More money	F. B. Williams, Sec.
Glen Rock	1913	150.00	Planting, trimming	More money	J. J. Lamb, Pres.
Hackensack	(6)	500.00	Insect control	Control of insects	D. G. Jeffers, Com'r.
Haddonfield	1911		No information. (2)		
Haddon Heights	1916	110.00	Trimming and general care	Planting new trees	C. H. Davis, Pres.
Haledon	1913	None.	Planting and general care		Paul Hueck, Pres.
Hasbrouck Heights	1911	300.00	Planting and general care		
Haworth	1911		No information. (2)		
Hawthorne	1913	None.	Trimming.	Money.	S. S. McCann, Pres.
Hightstown	1916	None.	Prevented careless destruction of trees	Public education	C. M. Franklin, Chm.
Hoboken	(5)				
Irvington	1911	1,500.00	Planting and care of trees	Money and public education	F. S. Green, Chm.
Jersey City	1913(5)	186,000.00(4)	Planting, trimming, spraying	Public education	A. Harry Moore, Dir.
Kearny	1909		No information. (2)		

SUMMARY OF SHADE TREE COMMISSIONS IN THE STATE, AND THEIR ACTIVITIES—Continued.

Community.	Commission Appointed.	Appropriation '1917.	Lines of Work Followed.	Special Needs.	Executive.
Leonia	1915(3)	300.00	Planting and general care	Arborist; cooperation	W. H. Guetersloh, Chm.
Lakewood	1910	100.00	Planting, trimming, etc.		C. L. Pack, Pres.
Lodi	1914	403.00	Planting, trimming, spraying	More money	Peter Schrener, Chm.
Lyndhurst	1914	100.00	Replacing and caring for all trees along highway	Labor	F. C. Schneider, Pres.
Madison	1907	800.00	Planting, general care, surgery	Underground wire; street grading.	Henry Hentz, Borough Forester.
Matawan	1915	None.	Inactive.		
Maywood	1911	100.00	Trimming.		E. Bilhuber, Chm.
Merchantville	1912	300.00	Planting, trimming, etc.	Money and tree surgery	S. Bryan Smith, Sec.
Metuchen	1898	200.00	Planting and general care	Advice and support	Dr. A. L. Ellis, Sec. and Treas.
Montclair	1908	13,500.00(4)	Planting and general care	General care of trees	G. M. Huttenloch, Supt.
Morristown	1910	None.	Inactive at present		
Mount Holly	1914	100.00	Encouragement and advice	Public co-operation	Dr. Chas. Harker, Pres.
Newark	1904(7)	65,000.00(4)	Planting and general care	Money and better cooperation.	Carl Bannwart, Sec.
North Plainfield	1910		No information. (2)		
Nutley	1912	1,000.00	Planting, trimming, general care	More money	Dr. J. A. Watts, Chm.
Oaklyn	1916	None.	Encouraging tree planting	Cooperation.	Samuel Sayer, Pres.
Orange	1917	None.	Cooperate with Street Committee		Wm. F. Vosstler, Mayor.
Passaic	(1)		No information. (2)		
Palmyra	1913	100.00	Trimming trees	Something to save sugar maples	F. W. Land, Pres.
Paterson	(1)	2,500.00	Trimming.	Larger appropriation	C. N. Merritt, Sec.
Pennington	1915(1)	200.00(4)	Trimming.		Elmer D. Magee, Pres.
Perth Amboy			Appointment of Park Commission abolished Shade Tree Commission		James L. Tooker, Supt. of Parks.
Plainfield	1907	2,000.00	Planting, trimming, spraying		Miles Roberts, Pres.
Point Pleasant	1910	None.	Inactive.	Interest	
Pompton Lakes	1914	100.00	Trimming and general care	Planting young trees	J. J. Bartholf, Pres.
Rahway	1910	800.00	Planting, trimming, spraying, general care	More money	Eugene Miller, Pres.
Ramsey	1910	100.00	Planting and trimming		Wm. Schroeder, Pres.
Ridgefield	1910(7)	140.00	Trimming and planting	Cooperation	John R. Bedford, Chm.
Ridgefield Park	(7)				
Ridgewood	1909	850.00(4)	Planting and general care	Advice and cooperation	S. P. Graydon, Sup't.
Riverton	1911	250.00	Trimming and spraying	Advice.	J. Carl DeLaCour, Sec.
Roosevelt	1917	None.	Inactive at present	Money.	Clarence Connors, Pres.
Roselle Park	1911	400.00	Planting.	Cooperation and money	Hart S. Van Fleet, Pres.
Rutherford	1909	2,000.00	Planting and general care	Money.	H. H. Edwards, Pres.

SUMMARY OF SHADE TREE COMMISSIONS IN THE STATE, AND THEIR ACTIVITIES—Continued.

Community.	Commission Appointed.	Appropriation 1917.	Lines of Work Followed.	Special Needs.	Executive.
Somerville	1912		No information. (2)		
South Orange	1903	1,750.00	Trimming and removing dead trees		Geo. K. Badger, Sec.
Summit	(3)				
Tenafly		607.01	Trimming.	Trimming.	H. Frank York, Pres.
Totowa	1914	None.	Planting and trimming	Personal interest of everyone	Frank Hiesler, Pres.
Trenton		2,500.00	Shade tree warden will be appointed soon. (5).		
Union	1917	None.	Commission not yet appointed		
Verona	1912	75.00	Trimming	More money	J. Edgar DeCamp, Pres.
Vineland	1906	350.00	Trimming, etc.	Larger appropriation	W. H. Blake, Sec.
Wallington			Inactive. Commission resigned		
Westwood	(3)				
Wharton	1912	100.00(4)	Care of parks	Cooperation. More shade trees.	L. K. Larrison, Pres.
Woodbine	1912		Inactive.		
Woodbury	1910	429.45	Planting, trimming, etc.	General care	B. W. Cloud, Pres.
Westfield	1905	1,100.00	Trimming, planting, general care	Money and competent help	E. D. Clark, Chm.
Wood Ridge	1910		No information. (2)		

(1) Park Commission has charge of shade trees.
(2) Had Commission in 1914; no report for 1917.
(3) Attention given to shade trees by a committee of Council.
(4) Part devoted to park work.
(5) Under commission government; work directed by Department of Parks and Public Property.
(6) No Shade Tree Commission, but trees and parks cared for by Improvement Commission (Town Government).
(7) Shade Tree Commission extinguished by adoption of commission government.

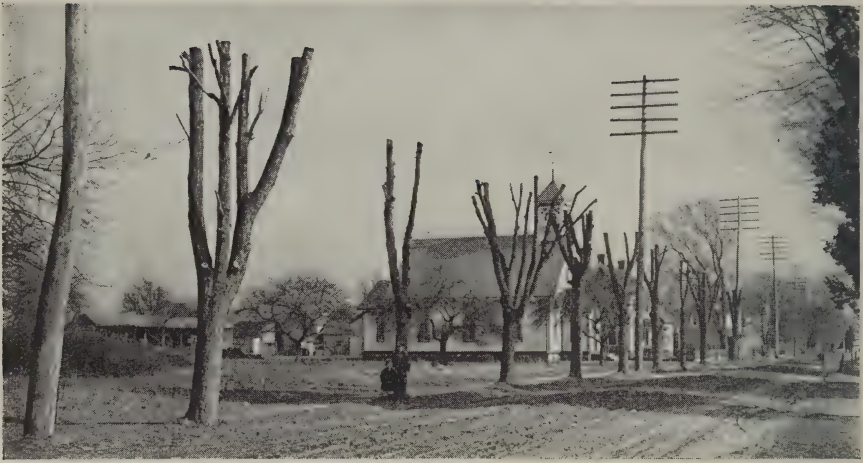

Fig. 10. Needless Mutilation of Shade Trees. Poles Should Have Been Shortened and Wires Carried Through and Below the Tree Crowns.

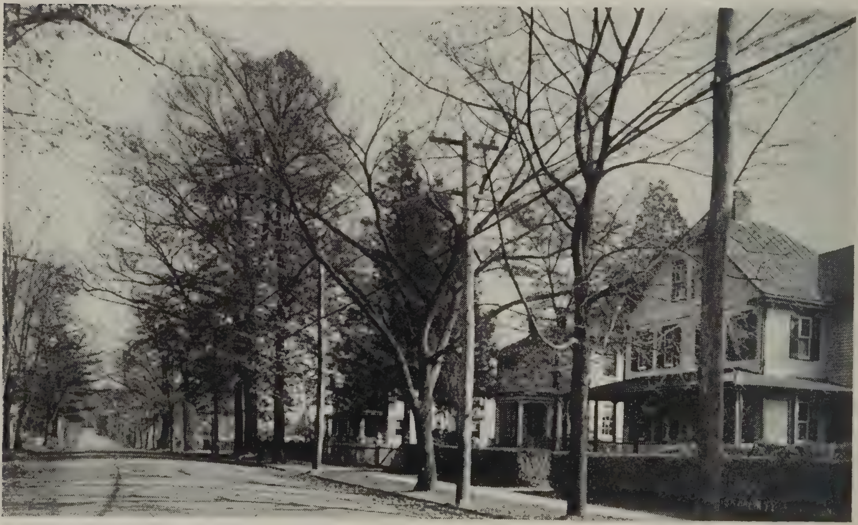

Fig. 11. High Tension Electric Cable Carried Through Street Trees with No Serious Injury Done.

Value of shade trees.—The worth of street shade trees has been estimated in a variety of ways, and the value set upon individual trees when one is destroyed by a responsible agency would indicate an aggregate of considerable magnitude. Several years ago the State Forester reached the conclusion that a very conservative estimate of the value of the shade trees in the State was upwards of $20,000,000. It is urged that this very considerable resource, one of the greatest of the assets of many of our communities, deserves more consideration than commonly is accorded it.

Electric construction.—During the year cordial relations have been established with two of the largest electric companies in the State and the Department is in a position to aid citizens, and especially shade tree commissions, in accommodating necessary electric construction through the lines already occupied by trees (fig. 11).

Road-side trees.—Immediately after its organization it was suggested to the State Highway Commission that provisions be made for shade trees along the State highways. It is unfortunate that outside municipalities, practically no thought has been given to the maintenance of tree shade along country roads. Manifestly, nothing will contribute more to the attractiveness of the State highways, or to the pleasure and comfort of their users, than well kept shade. This Department has expressed its readiness to cooperate to the end that this principle may be carried out on the highways to be constructed by the State and it hopes that other classes of roads will be similarly provided. It is, of course, absolutely essential that maintenance be included in the program. To plant a tree and leave it in an exposed condition without care is worse than useless.

Attractive school grounds.—The Department is also working in cooperation with the Department of Public Instruction toward having public school grounds ornamented with trees and shrubbery. Not every school is so located that a good effect can be produced, yet, by careful planning, and sometimes sacrificing a little playground, even a city school building hemmed in by brick and concrete can be given a touch of verdant beauty. The expense involved on a small plot is almost insignificant, while the advantage as an object lesson to the children is beyond estimate. This Department has no powers in this respect, yet is anxious and ready to be of service to the extent of its abilities. It is prepared to make a planting plan on the request of any public school board, and now has in preparation a bulletin dealing with the subject in some detail. Press of work may delay its issuance for a time.

TREE PESTS.

No serious outbreak, either of injurious insects or serious plant diseases must be recorded. The *Chestnut Blight* continues to take its toll and is moving steadily westward, altho there are some indications that its rate of progress is slowing up. The *White Pine Blister Rust* has reached a most serious stage in all the northern white pine section of the country and quarantines have been established between various states. In the exercise of his statutory powers, and for the protection of the white pines now in this State, the Secretary for Agriculture, on April 16, laid an embargo upon the importation of white pine plants, not lumber, from the New England States, New York, Pennsylvania, Wisconsin and Minnesota. Tho the disease has thus far been kept in control within New Jersey, there is little reason to expect that it will not advance in a manner similar to that of the chestnut blight, with this difference, that the pine blister rust attacks young seedling trees and the younger shoots of older trees rather than the body portions. The destruction of an old white pine tree therefore is likely to progress slowly. Control is especially difficult because the alternate host of the fungus is the leaves of currants and gooseberries. Contrary to the indicated policy in States having valuable white pine forests this State probably will have to sacrifice its white pines, so far as they are involved, in favor of the berry bushes, simply because the material value of the latter so greatly outweighs the material value of the pine trees. The owner of any pine trees which become infected has but two options, either to risk the loss of the pines or to undertake to get rid of every currant and gooseberry bush, wild or cultivated, his own and his neighbors, within a radius of at

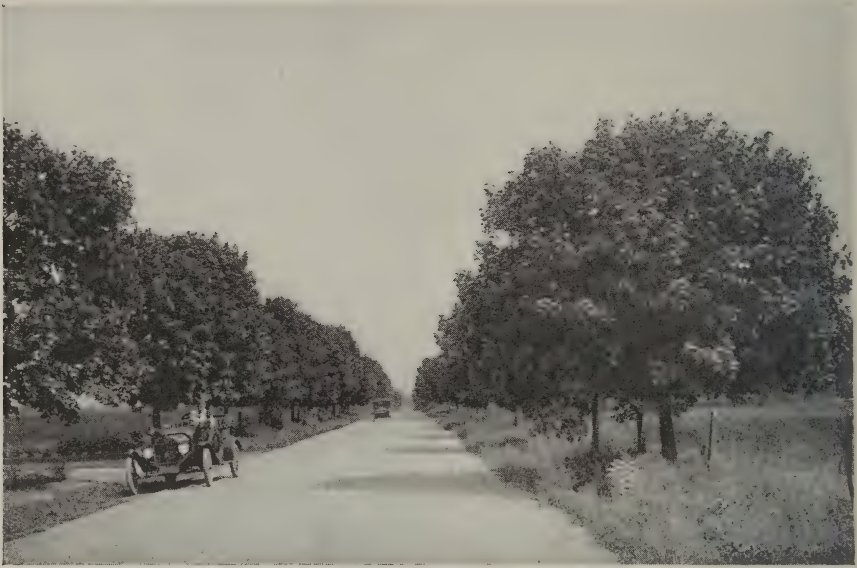

Fig. 12. New Jersey Needs Many Miles of Shaded Roads Like This.

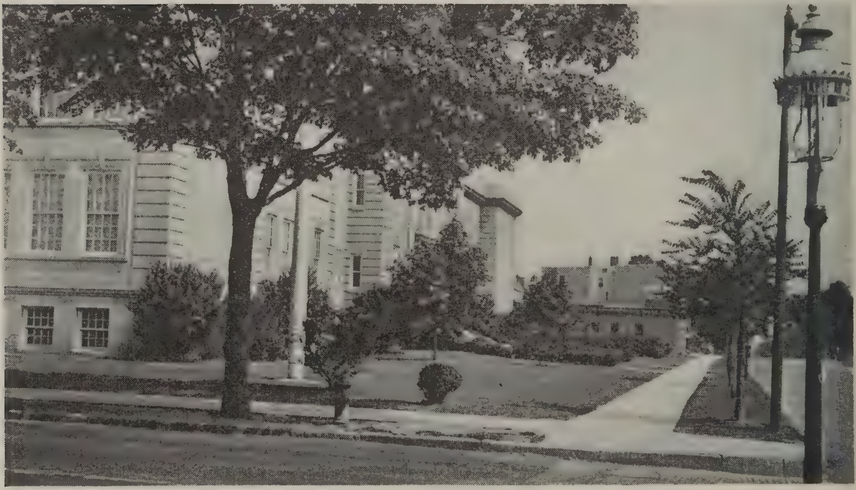

Fig. 13. A Public School with Trees and Shrubbery Well Disposed.

least a quarter of a mile. To retard the extension of the disease as much as possible it is advisable to destroy immediately every pine tree upon which it is discovered. The State Plant Pathologist will enforce this whenever it is necessary. No restriction is imposed upon white pine lumber as the disease does not affect it. Many cases of *wilting Maple Leaves* have been reported as heretofore. Pathological studies give evidence of a fungus in a few cases, but usually there is nothing to indicate that the trouble is not due to soil conditions. Few cases of death have been reported. It is consequently advised that owners fertilize their trees, water them freely, but not too much, and, where the foliage is over-developed, that the crowns be heavily thinned. In the spring the common leaf blight, or anthracnose, again caused the greater part of our *sycamores* to appear *distressed;* but, as usual, all, or most, soon recovered their leaves and little permanent injury appears to have been done.

The State is still practically free of the distinctive tree pests of New England, the gypsy moth and the brown tail moth. The *Elm Leaf Beetle* continues to be conspicuous by its small numbers; unless its depredations shall be more serious than they have been of late it is advised that systematic spraying be omitted in order that the money may be devoted to other purposes. *Caterpillars* of the *Tussock Moth* have been unusually prevalent, and in parts of North Jersey did considerable damage and became a positive pest. In cooperation with the State Entomologist a demonstration was made at the Trenton Fair with the object of showing how the insects can be controlled. This control is simply to destroy the egg masses found upon the trunks of the trees, and upon the sheltered parts of adjacent buildings, during the dormant season. If this is done thoroughly, it will not be necessary to spray the infested trees while the caterpillars are feeding, and little inconvenience will be suffered. Later in the season an effort will be made to have systematic collections made by school children under the direction of Shade Tree Commissions or other local authority. *Tent Caterpillars* and *Fall Web Worms* also have been unpleasantly conspicuous in many localities. These insects propagate chiefly in neglected trees and are easily controlled by burning out or tearing out the nests as soon as they begin to form. If this means of control is inconvenient, or is likely to injure valued trees, the insects can be destroyed by spraying the parts of the trees nearest the nests with arsenate of lead. Shade Tree Commissions, Village Improvement Associations, and other public agencies are urged to campaign against these unsightly nuisances. One borough in Morris County organized a clean-up last spring and carried it through most successfully. The *Hickory Bark Beetle* continues to be responsible for the loss of hickory trees in all sections, but every observation tends to confirm the rule that the trees attacked are those which have been weakened by fire, neglect or starvation. The remedy is to cut down and burn the wood of every tree that is badly infested, and, by food and water, to stimulate nearby healthy trees so that they may resist the insect attack.

Nine-tenths of all tree ills are the consequence of neglect. Reasonable care will prevent most of them.

DO NOT EMPLOY UNKNOWN TREE DOCTORS.

A man who does not know how will do your tree more harm than good. Consult the State Forester.

Report on Undeveloped Lands in New Jersey

BY THE

Department of Conservation and Development

LETTER REQUESTING A REPORT.

State of New Jersey,
Executive Department,
March 31, 1917.

My Dear Mr. Gaskill:

I would like to have from you, after you have had an opportunity to give it careful consideration, your recommendations for a plan and policy on the part of the State in conjunction with the use of prison labor to clear up a section of several hundred acres of prospective fertile, so-called waste land, all connected with the scheme worked out by you for putting it properly in use, somewhat along the lines of my discussion at Mr. Buzby's luncheon on Friday.

Of course, the question of buying such land and leasing it out is a matter of State policy, but I would like to know what the views of your Department are on this as soon as possible. It is a question I want to have worked out as a definite scheme before the Legislature meets again, as one of those things, if it works out as a practical policy, will be offered to the Legislature as a State policy.. It must be one of those things which will give some income to the State as we cannot work out any scheme to increase our income in other ways than by taxation.

Sincerely yours,
WALTER E. EDGE,
Governor.

Mr. Alfred Gaskill, Director,
Department of Conservation and Development,
State House.

His Excellency, WALTER E. EDGE,
Governor of New Jersey.

Sir:

In compliance with the request made in your letter of March 31, 1917, the Department of Conservation and Development has carefully studied the question of undeveloped lands in the State and submits the following report.

On behalf of the Board of Conservation and Development.

ALFRED GASKILL,
Director.

State House, September 14, 1917.

REPORT.

The suggestion that prison labor be used to make productive some of the waste lands of New Jersey appeals strongly to every member of the Department of Conservation and Development—alike because it offers an opportunity for the prisoners to rebuild their characters through creative work outdoors, as because its realization would enable the State to find healthful and productive employment for its criminal charges. But after studying the whole situation with care it is apparent that such an effort upon the upland, that is, in the wooded sections, would but create more farms to be disposed of in competition with the many that are now available, and with no advantage in the State-prepared land. If the proposal be applied to salt marsh, or fresh water swamp lands, the case is different, since drainage of either would bring forward types of soil having high fertility and adaptability to intensive culture, and the work of reclamation by prisoners at reasonable cost is apparently entirely feasible.

Yet our best information tends to raise a serious doubt of the wisdom of undertaking such a work at this time. Drainage is costly, even when undertaken in a large way and with the best appliances; and tho the soil is capable of yielding large returns we find little assurance of a demand for land that must carry a capital charge of upwards of $200 an acre, and even less assurance of farmers who have the necessary skill to farm such land profitably.

The situation as we find it appears to require the adoption and execution of a comprehensive policy of development in harmony with economic law. The violation of some of those laws, as that which requires a State to produce within its own borders as much as possible of what its people need, is at least partly responsible for the conditions which are sought to be changed. Comparatively little will be gained by any specific effort, as of land-clearing, so long as the causes of present conditions are unaltered.

The chief of these causes, in our opinion, are mosquitoes and inadequate highways; remove the one and improve the other and there will be little need for the State government to put any land in condition to be farmed. There is ample opportunity for the profitable employment of convicts and reformatory inmates upon the mosquito marshes and the highways.

We are fully satisfied that agriculture in the State can be greatly stimulated by offering cleared farms, wild lands and swamp lands to private enterprise, and, by encouraging their improvement, greatly increase the value of our resources. To the end that the State shall develop socially and industrially as well as agriculturally the following statements and recommendations are made.

OUR UNPRODUCTIVE LAND

On the basis of the facts and figures presented in the appendix to this report it is apparent that there are within the State of New Jersey upwards of a million and a quarter acres of land not now cultivated, but capable of producing profitable crops under modern farming methods. Approximately 400,000 acres of this land have been farmed but are now neglected or abandoned; 600,000 acres are still wooded but possess soil of a quality to justify the removal of the forest; 270,000 acres are in tide marsh and 110,000 acres in fresh water swamp. Appendix B, C, D.

With 400,000 acres of unused farm land it is apparent that the State's present need is farmers, not farms. Three-fourths of our population are aggregated in food-consuming centers and less than one-tenth engaged as food producers—a condition that may be ascribed to a stimulation of industrial activities at the expense of our agricultural interests, and one under which the State cannot hope to thrive permanently.

SOIL QUALITY.

Our territory is fitted by nature to produce more food of many kinds than our own people require. Knowing that our soils are as varied as the crops that they will produce, that the great city markets demand fruits and vegetables in great variety and at all seasons, as well as supplies of staples, it is clear that the opportunity for intensive farming is nowhere greater than it is in New Jersey. This means that each field should be used for the crop to which it is best adapted, and that a high order of agricultural skill is to be developed. Some of our lands are light, warm and easily worked, and, tho deficient in natural fertility, are held by skilled farmers to be capable of producing the highest returns when properly handled.

The objection so frequently urged that the sandy soils of South Jersey are not good for farming is answered by the fact that more of them were farmed successfully fifty years ago than now are, and that in certain sections—chiefly of Atlantic, Cumberland and Ocean counties, are thriving new farming communities. There are few farms in any part of the country that can be profitably worked nowadays without fertilizer—the most successful use it systematically. Our South Jersey soils are especially attractive to skilled truck farmers because they are early and quick, and because they are well adapted to labor-saving machinery—factors of importance in city markets and where the labor cost is determining. The American aim of a low labor cost rules in farming as in industry, and Europe's high acre-yield frequently entails an expenditure of man labor that if applied in this country would make the cost of the crop prohibitive. In several kinds of crops New Jersey's present ratio of product to man labor is nowhere exceeded.

LOW LAND VALUES

The low esteem in which a material part of our territory is held is disclosed in Appendix D, and deserves special consideration because it is a serious handicap upon the whole State. Column 4 of Table 3 shows that in many townships there is a discrepancy between the actual area and the acres assessed that in some cases amounts to as much as one-third of the whole and cannot be accounted for by the "lots" returned in the assessors' lists. The total of this discrepancy in 196 townships is 639,935 acres—one-eighth of all the land in the State! It is safest to assume that the land, or marsh, has escaped taxation by reason of its unproductiveness.

The low assessments borne in many cases are exhibited in column 6, wherein are found twenty-seven (27) townships in seven (7) counties whose average assessed land value (1916) is between $3.25 and $9.89 an acre. These twenty-seven townships have an aggregate area of 1,041,673 acres.

Almost as suggestive is the further fact that in the same counties are other townships in which the average land value is five or ten times as much. Of course, it is easily explained that the higher values usually are found where there is a town of some size. The significantly higher values that rule in other portions of every county have no place in this report, tho it should not be overlooked that not a little farm land in many parts of the State is producing returns on a valuation of as much as $1,000 an acre.

THE PROBLEM AT LARGE.

The situation, as we see it, requires that the whole available agricultural area—that which is now ready to farm, and that which must be recovered from the forest or the swamp, be offered to those who desire to be farmers. The lowest-priced lands, those that are uncleared, will be sought by pioneers—people with abundant working power but little money; the cleared farm lands, and the rich soils capable of being drained, will attract those who can command capital in moderate or large amounts.

The part of the State government in this enterprise is to create a demand for farms; to make all of our lands accessible by good roads so that there may be the widest possible choice of location, and every section have a chance to be developed; to remove every obstacle that now limits the cultivation of any of our soils; and to make the State's attractions known. By this means individuals will be encouraged to find the location and the kind of land best suited to the desire and the financial ability of each, be it land now ready for cultivation or that which must be cleared or drained. Manifestly, local roads—those by which farm produce can be transported at all seasons to the railroad or water carrier, are even more important than main highways; some must be undertaken by the State because the communities to be served are too poor to bear the cost.

SHALL THE STATE ACQUIRE LAND TO BE DEVELOPED?

With respect to the proposition that the State acquire a considerable tract of land to be improved and sold, or leased, to farmers, there is little to guide us. At its last session the Legislature of California created a "Land Settlement Board" and appropriated $250,000 with which to acquire and improve not more than ten thousand acres; the improved land to be sold later on favorable terms to trustworthy settlers. But no results have yet been attained, while correspondence with a State official indicates that the law was enacted partly because "real estate men have so increased land prices that it is a question whether a man can profitably farm land after paying their price for it." This situation does not exist in New Jersey. Our belief is that under present conditions it is inexpedient, indeed economically impracticable, for this State to acquire any of the unused land within its borders with a view to improvement and re-sale, for the following reasons:

1. *No public land in New Jersey.*—None of the land is public, but all is privately owned, and the most available is in comparatively small tracts. Any effort to acquire an area large enough to be handled advantageously would entail many difficulties, besides

involving either taking considerable poor land with the better, or giving an undeserved value to adjacent tracts left in private control.

2. *Large tracts variable.*—Tho tracts of 1,000 acres and more are on the market, their soils are usually so variable that improvement would involve expending as much effort upon the poorer as upon the better areas. One of the wrongs committed by land exploiters in this State lies in their failure to recognize a diversity in soils, and consequently in misleading the purchasers. Some types of soil are fitter for forests than for fields and should be devoted to forests without pretense that they are capable of higher development. Others are fit to be cleared and farmed under present conditions; still others should wait until the demand for arable land has absorbed most of that of higher grade.

3. *Swamps and marshes.*—Tho swamp and marsh areas reclaimable by drainage are much more uniform than the upland soils, tho their fertility is great and the difficulties of diverse ownership less, the cost of reclamation is so high, and the demand for such lands so doubtful, that a State undertaking on any considerable scale involves much uncertainty. Many people have seen in the drainage of marsh areas vast opportunities for the production of wealth; and it cannot be denied that marsh land possesses elements of fertility and adaptability to the use of machinery that apply to no upland situation. But against the manifest advantages of these locations must be set the facts that drainage works are costly, and that in the opinion of many agriculturists drained lands, as well as irrigated lands, require for their profitable working a kind and quality of agricultural skill that an ordinary farmer rarely possesses.

In this State marsh land was enclosed and drained as far back as 1700, and the record shows that upwards of 30,000 acres in all have been recovered; but the evidence at hand indicates that the area of such land under cultivation is increasing very slowly, and that some of the areas once recovered have been abandoned. No doubt the time will come when these highly productive lands can be put under cultivation with profit, or made to support herds of beef and dairy cattle; it would be unwise to embark upon the enterprise now.

The success of drainage projects in England, in Italy, and particularly in the Netherlands, is often referred to, yet it must be remembered that in those countries land famine justifies projects that could not be carried out here. Nothing will better serve to suggest caution in moving for the drainage of our marshes than the statement that the reclamation of 520,000 acres of the Zuyder Zee is expected to entail a cost of $363 per acre. The collateral statement that the land is expected to yield $140 per acre a year is, of course, based upon the assumption that it will be in demand and that competent farmers are ready to pay the purchase price, or equivalent rental.

We might indeed provide for the agricultural drainage of a moderate area of salt marsh in connection with mosquito control, as a means of fixing the cost and proving how much demand there is for it, but except in an experimental way it is especially inadvisable to combine the recovery of the salt marshes with mosquito drainage because the latter is needed at once and costs less than four dollars an acre. Appendix B.

4. *To clear forest would increase area now unused.*—If forest or brush land, however good the soil, were taken up by the State, and, after being cleared by convicts, offered for sale, we would simply increase the present excess of unfarmed farm land without finding farmers, for such land when cleared would have little or no advantage over that which has lain fallow for years. Similarly, to drain swamp or marsh land as a State project would tend to set up a competition between them and the low-cost upland fields of which we now have an excess. Our situation is in no way comparable with that in some of the Western States, where a demand for farms is being satisfied by irrigation works, executed by the Federal Government, that determine a capital investment of from $80 to $120 per acre; with some state projects by which school lands, assigned by the Federal Government for the support of public schools, are made fit for farming before they are sold or leased. The popular belief that these western projects are uniformly successful is somewhat disturbed by the following statement made in the Report of the Reclamation Service for 1915-16, page 11: "The principal difficulty with which the average settler on the reclamation projects has to contend is the lack of sufficient capital. In some cases the settler may originally have had considerable capital, but his lack of

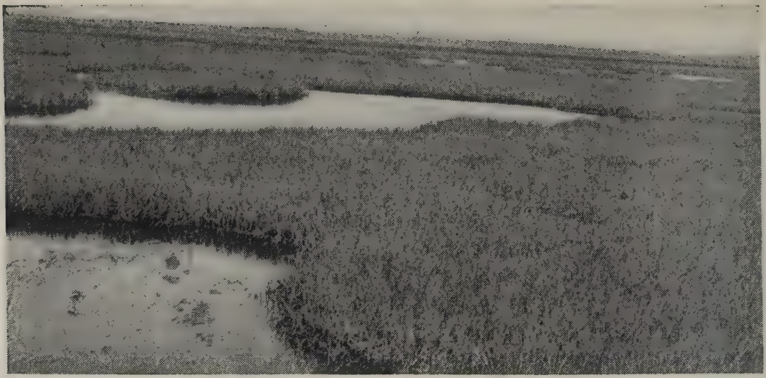

Fig. 14. Breeding Pools in the Salt Marsh Which Must be Filled or Opened to the Tides.

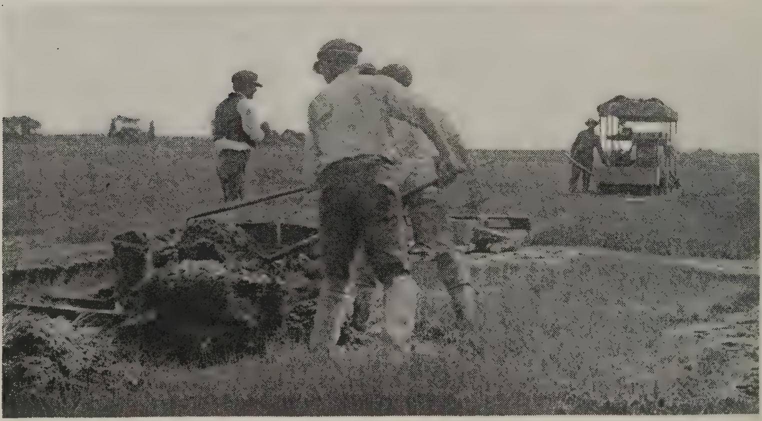

Fig. 15. Cutting a Mosquito Ditch by Machinery.

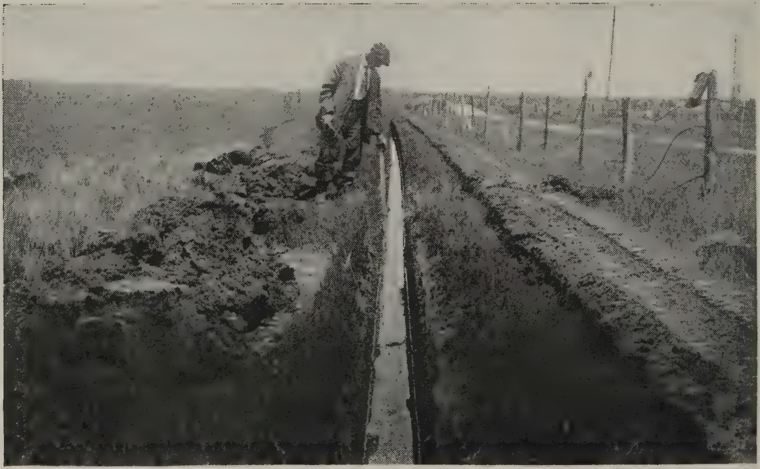

Fig. 16. A Machine-cut Ditch by Which Tidal Water is Made to Ebb and Flow and Killie Fish Given Access to Mosquito Larvæ.

experience, or other misfortune, has operated to his disadvantage until his funds have been practically exhausted, and after he has acquired the necessary experience he is often unable to recover his standing for lack of the necessary capital. This lack of capital is felt more acutely the larger the area acquired or attempted to be cultivated. The instances of success with small capital, especially in the case of inexperienced settlers, are confined almost entirely to small holdings."

WHAT THE STATE CAN DO.

The means by which the State's soil resources can be developed involve little more than direct advertising and removing the barriers. It is probable that the removal of the barriers alone—they are mainly lack of knowledge, prejudice and mosquitoes—will turn a tide toward us and quickly set New Jersey far beyond any position it ever has occupied as a food producer. It is therefore strongly recommended that provision be made to accomplish the following:

First. To advertise our farm attractions as other states do and secure farmers by our merit. In support of such an effort we can offer greater positive, not prospective, inducements than any other State. They include a *climate* that is moderate, agreeable and well adapted to many crops; *soils* suited to the most intensive, and therefore the most profitable, forms of agriculture; the best nearby *markets* of the world; unequalled *transportation* facilities; nearby *schools, churches and social opportunities.* For this purpose, $100,000, or $20,000 a year for five years, should be provided. There are ample assurances that in this effort the State would have the active support of the railroads and of many property interests.

Second. To counteract the movement from the farms to the cities by lessening the hardships and uncertainties incident to farm life, and increasing its attractions. This effort must be comprehensive and enlist every progressive agency. The Highway Department must see that good roads serve every farming region; the Department of Public Instruction must provide vocational training leading to, not from, the farms; other agencies must look after social matters, recreation, etc. The important question of crop distribution demands special attention, though we believe that the solution of this problem lies chiefly in Federal action and that any effort upon State initiative will be largely ineffective. No attempt is made to determine the amount of money that profitably can be expended in these directions because they are joined so intimately with current activities.

Third. To meet the labor problem in a positive way. No doubt this difficulty has been magnified by the farmers' reluctance to make wages, hours and living conditions as attractive as they are in the cities, but disaster can be the only result of uncontrolled competition for labor between the farms and the industries. We have allowed immigrants to enter our ports and go on to other states without making an effort to divert them to the service of our own people. If the present activities of the Department of Labor are supplemented, after the war ends, by employment agents at Gloucester and Ellis Island, much valuable labor can be secured. Manifestly, the farmers will have to do their part. This effort may require as much as $10,000 a year for an indefinite period.

Fourth. To locate and list every farm, or part of a farm, that is for sale or for rent and be prepared to find a place for every man and every family that is attracted to us. The Department of Agriculture is now doing this in a limited way; it lacks funds to extend its organization so that farmers may be drawn to the State, and from our own cities to the farms, and authority to check the pernicious activities of irresponsible promoters. For this purpose $6,000 a year for not less than five years is required.

Fifth. To inaugurate actively and at once a campaign to exterminate the salt-marsh mosquitoes. It has been demonstrated that these pests are chiefly responsible for most of the abandoned farms in South Jersey, as they are for the general backwardness of much of the territory within their range of flight. Trustworthy estimates indicate that they can be practically eliminated within five years at a cost of not over $750,000, in addition to what the counties are prepared to expend, and that the resultant benefit in increased ratables on farm, shore resort, suburban and city property may easily be as much as five hundred millions. Appendix E. Prisoners are entirely competent to perform nearly all the labor and we strongly urge that they be employed. The work can be directed by the Agricultural Experiment Station under existing law, or can be made a function of this Department, as shall be most advisable.

THE COST AND THE RESULTS.

The debit and credit of the program proposed may be stated thus, assuming that road improvement and educational extensions are provided for:

Dr.

To salt-marsh mosquito campaign	5 years	(see p. 78)	$750,000
To advertising State resources	5 "	(see p. 77)	100,000
To maintaining labor bureau	5 "	(see p. 78)	50,000
To maintaining farm agency	5 "	(see p. 78)	30,000
Total			$930,000

The first item will be required but once, the others probably will have to be continuous.

The results of the effort will be cumulative. The mere announcement of the State's purpose will bring no small return, and it is possible to estimate the gain within five years, but it is safer to look forward twenty years. The following is on that basis and deliberately assigns the greater credit to mosquito control.

Cr.

By Control of Mosquitoes—	
Increase in farm values in eight (8) South Jersey counties (see p. 92)	$107,000,000
Increase in property values, shore resorts (see p. 92)	200,000,000
Increase in property values, metropolitan districts (see p. 92)	200,000,000
By increase in farm values, North Jersey (see p. 93)	144,000,000
By increase in town values, whole State (see p. 93)	249,000,000

If an average tax rate of 1½ per cent may be assumed, the above will yield to the State and its communities an annual revenue of thirteen and a half million dollars more than they now enjoy.

It is easily possible to say that any, or all, of the foregoing estimates are extravagant when it is considered that the total land valuation of the State, without improvements, is (1916) but $974,127,926. And we admit freely that this estimate, like every estimate of its kind, is determined largely by the personal point of view. To control this as much as possible graphic curves have been drawn showing the State's growth in taxable values for the past twenty years and projecting them to indicate values twenty years hence. Unfortunately, land and its improvements were not separated prior to 1915, and we are obliged to compare total net taxable values. For the whole State the ratables increased from $812,616,240 in 1897 to $2,688,321,979 in 1916. The curve extended shows approximately $4,800,000,000 in 1936.

But knowing that the greater part of the State's wealth is returned by the metropolitan district, the figures for Bergen, Essex, Hudson, Passaic and Union counties were separated from those for the rest of the State and figures found that would represent with reasonable accuracy the growth of those sections with which we are concerned. It would be questionable to assume that the future growth of the State as a whole will be maintained at the present rate, but it appears entirely safe to anticipate a rate of growth in the more backward sections, which, under the stimulus proposed, will show no falling off. In this way, then, it is found that the total net taxable value in sixteen counties was $302,063,367 in 1897; $761,883,089 in 1916; and is likely to be not less than $1,400,000,000 in 1936. This last is fifty per cent more than the sum that we have ventured to expect. That every part of the State is likely to grow materially without reference to the program advanced here is self-evident and requires no discussion. We are confident that New Jersey is ready to take a strong step forward and that it is entirely possible to realize all that this report suggests.

By way of contrast it may be noted that before the war 60 per cent of the land area in Belgium was cultivated, only 6 per cent was farmland not cultivated, and 18 per cent was in forest; whereas but 40 per cent of our area is in improved farms, 9 per cent is farm land not improved, and 46 per cent is in forest.

The maps, tables and explanatory text presented in the appendix exhibit in some detail the authority for the statements and conclu-

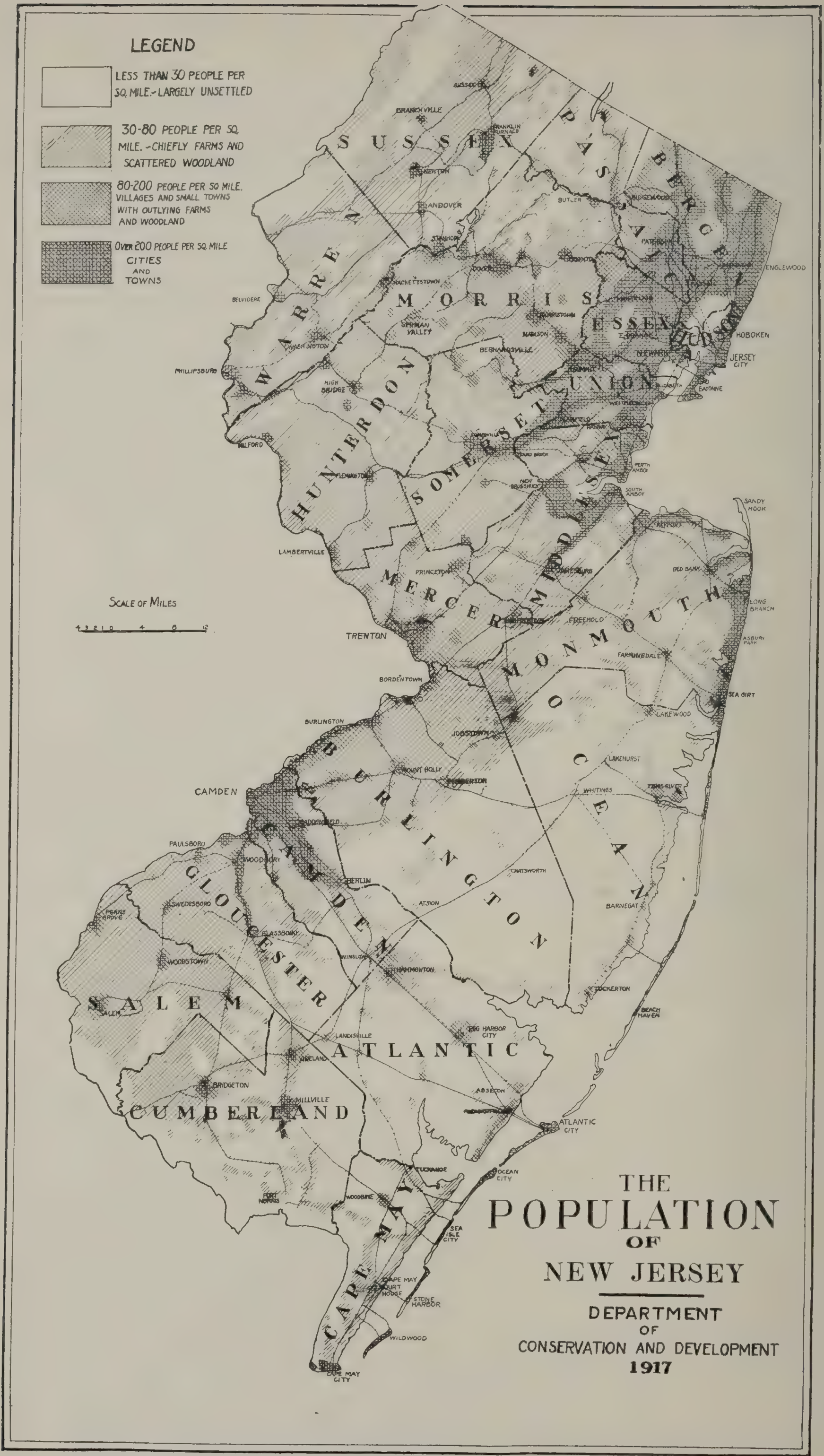

Fig. 17. Map Showing Distribution of Population in New Jersey.

sions submitted above and give other important information never before brought together.

In preparing this report the Department has enjoyed the cordial cooperation of the Departments of Agriculture, Labor, and Public Instruction, of the State Board of Taxes and Assessment and of the Agricultural Experiment Stations.

APPENDIX.

A. POPULATION MAP.

The map is made to show the distribution of population in New Jersey. It ignores political boundaries and indicates where people are congregated and where they are few. The symbols are necessarily generalized, since it is impossible to show each small area of denser population or any single farms. The significant points are that the greatest density covers a restricted territory—chiefly west and south of New York, east of Philadelphia, and along the coast; that the south central section is very sparsely populated, and that most of the State outside these distinctive areas is indicated as devoted to farming. It will be observed that most of the land in cultivation is close to the railroads and the waterways.

Attention is directed to the fact that the maximum density represented, 200 per square mile, is not greater than that of many villages; Trenton contains 11,793 people per square mile, and Jersey City 21,829 per square mile. Though the population density of New Jersey, 405 per square mile, is exceeded only by that of Rhode Island and Massachusetts, 75 per cent of all the people are found in communities of over 2,500, occupying less than 6 per cent of the whole area. Outside these communities the population is far below the capacity of the land. Table 2, page 84.

B.—UNPRODUCTIVE FARM LAND—Table 1.

This table brings together the most trustworthy figures obtainable bearing upon the magnitude and location, by counties, of the untilled lands in the State.

Table 1: Unproductive Farm Lands in New Jersey—By Counties.

County. (1)	Farmland unimproved, exclusive of woodland. (2) acres	Woodland not cleared, but soil of good quality. (3) acres	Fresh-water swamps that can be drained. (4) acres	Tide Marsh available by drainage. (5) acres	Total. (6) acres
Bergen	6,702	4,000	2,760	7,378	20,840
Essex	3,670	......	4,840	2,631	11,141
Hudson	525	......	......	7,468	7,993
Hunterdon	11,999	10,000	......	......	21,999
Mercer	7,151	10,000	240	376	17,767
Middlesex	7,049	20,000	2,380	8,000	37,429
Monmouth	9,416	25,000	1,700	3,378	39,494
Morris	20,352	40,000	10,940	......	71,292
Passaic	5,873	5,000	3,120	......	13,993
Somerset	10,788	10,000	710	......	21,498
Sussex	25,799	20,000	5,580	......	51,379
Union	1,501	2,000	900	3,413	7,814
Warren	12,634	20,000	1,460	......	34,094
North Jersey	123,459	166,000	34,630	32,644	356,733
Atlantic	8,019	100,000	11,870	53,325	173,214
Burlington	20,862	75,000	19,190	9,643	124,695
Camden	6,650	20,000	4,120	2,664	33,434
Cape May	12,723	30,000	9,000	52,638	104,361
Cumberland	24,170	60,000	9,910	46,661	140,741
Gloucester	10,149	40,000	2,680	7,735	60,564
Ocean	6,859	100,000	17,100	40,400	164,359
Salem	19,499	10,000	1,400	21,780	52,679
South Jersey	108,931	435,000	75,270	234,846	854,047
The State	232,390	601,000	109,900	267,490	1,210,780

Unimproved Farm Land.—The figures in column 2 are from the last Federal census (1910), tho there is good reason to believe that the aggregate is nearly twice as much. The Department has undertaken a canvass to determine more accurately the present unimproved acreage, but as that cannot be completed for some time it is assumed for the present that the State total is 400,000 acres. In any case the presence of a great area of farm land not now in tilth is established.

Woodland.—In column 3 are presented estimates, and they pretend to be no more, made by the State Forester and the Director of the Agricultural Experiment Station, of the land now in forest or brush which is good enough to be farmed. It is probable that the area thus available is greater rather than less than is indicated. In parts of Atlantic and Cumberland counties this kind of land is being taken up in considerable quantity.

Drainage Lands.—In column 4 is given the approximate area of drainable *fresh water swamps.* The figures were taken by planimeter from State maps and include only tracts of more than 100 acres known to be not now in cranberries or other tillage. Smaller areas were excluded as of doubtful value. Some of the swamps may not be recoverable, some probably will be devoted to other uses than agriculture. Each county aggregate represents simply a possibility.

The *Tide Marsh* area, column 5, has been accurately determined by the State Geological Survey; the figures given are the official ones *reduced* by the following estimates of the acreage now banked or in cultivation:

Bergen County	1,000	acres
Burlington County	300	"
Camden County	300	"
Cape May County	1,000	"
Cumberland County	6,000	"
Essex County	2,000	"
Gloucester County	3,000	"
Hudson County	4,000	"
Middlesex County	200	"
Salem County	10,000	"
Union County	1,000	"
Total	28,800	"

C.—LAND AND POPULATION, BY COUNTIES—Table 2.

This table supplements the population map, Appendix A, and gives the standing of the State's greater units with respect to area, farmland, forests and population.

Table 2: Land, Farm and Forest Areas, and Population of New Jersey—By Counties.

County.	Upland	Farmland.			Forest.		Population	
		Improved.		Unimproved.				
	Acres.	Acres.	Per Cent of Upland.	Acres.	Acres.	Per Cent of Upland.	Total.	Per. Sq. Mile.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Atlantic	307,409	34,035	11.7	8,019	271,638	88	82,840	173
Bergen	143,470	32,083	22.4	6,702	57,591	40	178,596	796
Burlington ...	511,756	175,231	34.2	20,862	303,777	59	74,737	93
Camden	139,101	50,187	36.1	6,650	66,588	48	163,221	751
Cape May.....	110,674	18,388	16.6	12,723	80,851	73	24,407	141
Cumberland ..	267,580	96,829	36.2	24,170	166,264	62	59,481	142
Essex	76,746	13,130	17.1	3,670	24,239	32	566,324	4,723
Gloucester ...	201,503	106,812	53.0	10,149	74,818	37	43,587	138
Hudson	15,786	935	5.9	525	713	05	571,371	23,132
Hunterdon ...	279,919	203,862	72.8	11,999	39,481	14	34,697	79
Mercer........	144,229	103,761	71.9	7,151	15,829	11	139,812	620
Middlesex	191,440	82,678	43.2	7,049	60,164	31	144,716	484
Monmouth ...	300,999	156,583	52.0	9,416	89,711	30	107,636	229
Morris	303,910	98,375	32.4	20,352	140,101	46	81,516	171
Ocean	360,171	24,768	6.8	6,859	313,087	87	23,011	41
Passaic	125,488	23,309	18.6	5,873	75,204	60	236,364	1,205
Salem	188,138	124,703	66.3	19,499	50,057	27	30,292	103
Somerset	194,165	136,057	70.0	10,788	28,613	15	44,123	145
Sussex	338,393	161,283	47.7	25,799	136,538	40	25,977	49
Union	61,304	17,490	28.5	1,501	14,350	23	167,322	1,746
Warren	231,769	142,837	61.6	12,634	60,205	26	44,314	122
The State...	4,494,567	1,803,336	40.1	232,390	2,069,819	46	2,844,342	405

It is significant that only 40 per cent of the State's upland area is in improved farms and that 46 per cent is still classed as forest; that four counties have a population of over 1,200 to the square mile, while four counties have less than 100 to the square mile, and thirteen counties have less than the State average—405 per square mile.

The figures in column 2 are from records of the State Geological Survey; those in column 3 from the 1910 census; those in column 4 are calculated from those in columns 2 and 3; those in column 5 are from the 1910 census tho apparently too low—see page 82; those in columns 6 and 7 are from records of the State Geological

Survey (tho the present forest area is somewhat less in the metropolitan districts, near the coast, and in favored agricultural sections than when these figures were compiled, it is greater in several counties and the total for the State is not far wrong); the figures in column 8 are from the State census and those in column 9 are calculated from columns 2 and 8.

D.—LAND VALUES—Table 3.

The purpose of Table 3 is to show how extremely low is the value of land in a large part of the State. By excluding the more populous units, which manifestly return the highest values, attention is centered upon the less advanced sections.

The figures may be accounted trustworthy, being from the following sources: those in column 2 are from the records of the State Geological Survey; those in columns 3 and 5 are from the report of the State Board of Taxes and Assessments for 1916; they cover only the area returned in acres—not that covered by "lots," tho the aggregate of the latter is sometimes considerable; it has not been possible to harmonize apparent discrepancies between some of the figures in columns 2 and 3; the figures in column 4 show the difference between the measured acreage and the assessed acreage and are in all cases a little high because "lots" are ignored and no allowance is made for roadways, etc.; the figures in column 6 were obtained by dividing the "acres assessed" in column 3 into "total taxable value" in column 5. They are not too low because the value of *all* improved land is covered in column 5, whereas the acreage of "lots" and the acreage not assessed are ignored.

It should be borne in mind that this table includes only the less populous communities. Some cities, e. g., Millville, are represented because they have a large unsettled territory, while some townships, e. g., Center, Camden County, Chester, Burlington County, are left out because they are comparatively densely populated.

The special significance of the figures in columns 4 and 6 is discussed at page 73.

Table 3: Land Values in Agricultural and Wooded Sections of New Jersey by Townships.

All Municipalities Having Little Open Land, and Essex, Hudson and Union Counties Entre, are Excluded.

County and Township.	Acres Upland and Tide Marsh.	Acres Assessed.	Acres Not Assessed.	Taxable Value (Land Alone).	
				Total.	Average per Acre.
(1)	(2)	(3)	(4)	(5)	(6)
Atlantic—					
Buena Vista	31,303	29,749	1,554	$331,175	$11.13
Egg Harbor (Twp.)	45,887	36,466	9,421	999,875	27.42
Folsom (Boro.)	5,800	5,314	486	60,750	11.43
Galloway	59,234	38,745	20,489	605,455	15.63
Hamilton	72,690	70,140	2,550	632,950	9.02
Hammonton (Town)	28,805	24,703	4,102	1,162,985	47.08
Mullica	35,083	32,681	2,402	227,831	6.99
Port Republic (City)	5,900	3,805	2,095	41,425	10.89
Weymouth	46,907	36,105	10,802	192,247	5.32
9 Townships			53,901		
Bergen—					
Franklin	11,800	10,381	1,419	536,685	51.70
Hohokus	16,220	20,511a		697,875	34.02
Rivervale	3,300	2,460	840	194,669	79.13
Washington	1,785	2,106a		167,440	79.51
Oakland (Boro.)	6,000	4,761	1,239	159,414	33.48
Saddle River (Boro.)	2,970	2,961	9	160,150	54.09
Upper Saddle River (Boro)	3,400	2,906	494	120,600	41.16
7 Townships			4,001		
Burlington—					
Bass River	50,000	37,600	12,400	151,292	4.02
Bordentown (Twp.	5,000	4,545	455	128,696	28.32
Burlington (Twp.)	9,900	8,136	1,764	238,400	29.30
Chesterfield	14,159	12,645	1,514	262,975	20.79
Cinnaminson	4,800	4,109	691	297,275	72.35
Delran	3,654	3,654	0	184,335	50.45
Easthampton	4,100	3,223	877	117,475	36.45
Evesham	18,947	15,977	2,970	369,806	23.15
Florence	6,121	4,814	1,307	178,379	37.06
Lumberton	13,850	9,746	4,104	275,326	28.25
Mansfield	14,614	12,449	2,165	302,430	24.29
Medford	26,880	22,232	4,648	447,501	20.13
Mt. Laurel	14,162	12,897	1,265	463,780	35.96
New Hanover	14,584	12,228	2,356	214,331	17.53
North Hanover	11,600	10,146	1,454	160,820	15.85
Pemberton (Twp.)	40,960	34,781	6,179	388,170	11.16
Shamong	30,500	22,197	8,303	180,750	8.14
Southampton	30,204	19,470	10,734	465,942	23.93
Springfield	18,929	16,201	2,728	357,807	22.08
Tabernacle	34,800	29,581	5,219	121,960	4.12
Washington	68,450	48,138	20,312	170,428	3.54
Westampton	7,900	6,497	1,403	201,350	30.97
Willingboro	4,632	4,090	542	142,950	34.95
Woodland	64,700	46,174	18,526	150,215	3.25
24 Townships			111,916		

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a Evident error in assessment figures.

Table 3—(Continued).

County and Township.	Acres Upland and Tide Marsh.	Acres Assessed.	Acres Not Assessed.	Taxazle Value (Land Alone).	
				Total.	Average per Acre.
Camden—					
Berlin	5,050	3,540	1,510	189,280	53.47
Clementon	8,600	6,894	1,806	473,325	68.66
Delaware	15,800	14,301	1,499	624,850	43.69
Gloucester	14,700	13,110	1,590	426,150	32.50
Voorhees	9,000	8,965	1,035	235,502	26.27
Waterford	23,600	17,547	6,053	285,225	16.25
Winslow	35,000	31,481	3,519	445,845	14.16
7 Townships			17,012		
Cape May—					
Dennis	40,369	31,725	8,644	241,782	7.62
Lower	17,817	12,165	5,652	316,560	26.02
Middle	44,940	27,650	17,290	439,150	15.88
Upper	39,389	29,872	9,517	295,528	9.89
Woodbine (Boro.)	5,700	4,855	845	232,300	47.84
5 Townships			41,948		
Cumberland—					
Commercial	21,719	14,041	7,678	206,445	14.70
Deerfield	30,372	26,108	4,264	750,965	28.76
Downe	36,040	26,367	9,673	190,415	7.22
Fairfield	27,850	21,202	6,648	266,192	12.55
Greenwich	12,154	9,302	2,852	244,700	26.30
Hopewell	19,972	17,207	2,765	778,395	45.24
Landis	42,576	35,938	6,638	1,305,825	36.33
Lawrence	22,959	22,495	464	269,345	11.97
Maurice River	60,722	51,761	8,961	331,167	6.39
Millville (City)	28,780	23,438	5,342	1,481,650	63.21
Stow Creek	12,250	11,257	993	290,825	25.83
11 Townships			56,278		
Gloucester—					
Clayton (Boro)	5,223	3,816	1,407	198,650	52.06
Deptford	12,100	10,555	1,545	516,190	48.90
East Greenwich	9,082	8,784	298	327,800	37.32
Elk	15,251	11,817	3,434	285,185	24.13
Franklin	34,829	34,645	184	548.625	15.84
Glassboro	5,960	5,473		486,475	88.89
Greenwich	5,700	5,460	240	511,659	93.71
Harrison	12,800	11,960		485,150	40.56
Logan	15,365	13,522	1,843	429,950	31.79
Mantua	10,576	9,189	1,387	464,805	50.58
Monroe	29,335	26,698	2,637	467,495	17.51
South Harrison	10,760	9,700	1,060	360,550	37.17
Washington	14,448	13,295	1,153	386,400	29.06
West Deptford	10,000	8,990	1,010	561,050	62.41
Woolwich	13,645	12,896	749	455,075	35.29
15 Townships			16,947		

Table 3—(Continued).

County and Township.	Acres Upland and Tide Marsh.	Acres Assessed.	Acres Not Assessed.	Taxable Value (Land Alone).	
				Total.	Average per Acre.
Hunterdon—					
Alexandria	17,454	16,643	811	252,575	14.48
Bethlehem	13,800	12,368	1,432	162,660	13.15
Clinton (Twp.)	22,600	20,491	2,109	361,600	17.69
Delaware	24,400	23,002	1,398	584,220	25.40
East Amwell	18,900	17,699	1,201	283,330	16.01
Franklin	14,631	14,283	348	815,825	22.11
Holland	14,995	14,324	671	226,675	15.82
Kingwood	23,271	21,766	1,505	312,100	14.33
Lebanon	22,000	19,784	2,216	285,525	14.43
Raritan	24,584	22,778	1,806	416,600	18.28
Readington	31,190	29,326	1,864	526,600	17.95
Tewksbury	20,660	19,659	1,001	328,900	16.73
Union	12,734	12,276	458	186,745	15.21
West Amwell	14,000	13,325	675	177,525	13.32
14 Townships			17,495		
Mercer—					
East Windsor	10,402	9,706	696	448,400	46.19
Hopewell	37,562	32,660	4,902	1,178,470	36.08
Lawrence	13,862	12,325	1,537	1,043,665	84.67
Princeton (Twp.)	10,532	9,883	649	901,460	91.21
Washington	13,309	12,377	932	452,695	36.57
West Windsor	16,854	15,862	992	800,129	56.74
6 Townships			9,708		
Middlesex—					
Cranbury	11,336	11,022	314	450,600	40.88
East Brunswick	14,800	12,426	2,374	610,290	49.11
Madison	23,998	21,000	2,998	525,050	25.00
Monroe	27,612	19,313	8,299	627,790	32.50
North Brunswick	8,950	7,549	1,401	407,685	54.00
South Brunswick	31,341	28,188	3,153	768,200	27.25
6 Townships			18,539		
Monmouth—					
Atlantic	20,264	17,960	2,304	669,272	37.26
Freehold	25,719	21,149	4,570	1,591,630	75.25
Holmdel	11,500	11,276	224	629,610	55.83
Howell	41,909	27,628	14,281	582,225	21.07
Manalapan	19,617	17,958	1,659	601,150	33.47
Marlboro	19,568	17,226	2,342	803,400	46.63
Matawan	4,861	4,241	620	303,240	71.50
Millstone	25,354	23,578	1,776	520,006	22.05
Upper Freehold	30,268	29,197	1,071	867,155	29.70
Wall	23,500	12,700	10,800	1,109,235	87.34
10 Townships			39,647		

Table 3—(Continued).

County and Township.	Acres Upland and Tide Marsh.	Acres Assessed.	Acres Not Assessed.	Taxable Value (Land Alone).	
				Total.	Average per Acre.
Morris—					
Boonton (Twp.)	6,300	4,936	1,364	98,225	19.82
Chatham (Twp.)	6,500	5,312	1,188	302,150	56.88
Chester	19,328	17,813	1,515	360,980	20.26
Denville	8,400	6,520	1,880	276,950	42.48
Hanover	31,845	27,064	4,781	1,443,380	53.33
Jefferson	27,315	24,417	2,898	454,095	18.60
Mendham (Twp.)	11,850	11,007	843	219,300	19.92
Montville	12,064	10,748	1,316	301,875	28.09
Mt. Olive	20,036	17,343	2,693	245,900	14.18
Passaic	21,322	18,667	2,655	920,105	49.29
Pequannock	22,080	19,541	2,539	420,700	21.53
Randolph	16,400	11,890	4,510	276,475	23.25
Rockaway	30,250	22,523	7,727	714,850	31.74
Roxbury	14,250	11,637	2,613	293,616	25.23
Washington	28,596	25,200	3,396	337,925	13.41
15 Townships			41,918		
Ocean—					
Berkeley	28,462	20,958	7,504	1,139,384	54.36
Brick	18,420	13,859	4,561	395,295	28.52
Dover	25,892	20,743	5,149	853,467	41.14
Eagleswood	9,857	4,482	5,375	64,366	14.36
Jackson	62,996	51,506	11,490	252,740	4.90
Lacey	59,169	40,028	19,141	187,303	4.68
Little Egg Harbor	29,437	10,294	19,143	88,575	8.60
Manchester	56,350	71,937a		337,699	4.69
Ocean	10,863	8,827	2,036	71,741	8.13
Plumstead	25,722	18,290	7,432	193,763	10.59
Stafford	27,444	19,858	7,586	144,555	7.28
Union	20,823	12,678	8,145	156,145	12.32
12 Townships			97,562		
Passaic—					
Pompton	32,096	26,941	5,155	881,550	32.72
Wayne	17,011	14,453	2,558	1,098,700	76.02
West Milford	50,010	46,310	3,700	1,046,225	22.59
3 Townships			11,413		
Salem—					
Alloway	21,789	18,894	2,895	423,355	22.41
Elsinboro	8,424	7,896	528	167,504	21.21
Lower Alloways Creek	29,221	25,343	3,878	358,600	14.15
Lower Penn's Neck	15,005	12,900	2,105	325,911	25.26
Mannington	24,251	22,219	2,032	734,873	33.07
Oldmans	12,926	12,360	566	303,639	22.78
Pilesgrove	22,508	21,244	1,264	850,500	40.03
Pittsgrove	31,643	24,153	7,490	377,260	15.62
Quinton	15,871	12,921	2,950	281,535	21.79
Upper Penn's Neck	11,473	10,115	1,358	285,415	28.21
Upper Pittsgrove	22,753	22,753		816,445	35.88
11 Townships			25,066		

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a Evidently an error.

Table 3—(Continued).

County and Township.	Acres Upland and Tide Marsh.	Acres Assessed.	Acres Not Assessed.	Taxable Value (Land Alone).	
				Total.	Average per Acre.
Somerset—					
Bedminster	17,292	16,043	1,249	502,310	31.32
Bernards	26,497	24,948	1,549	1,860,790	74.59
Branchburg	13,032	12,309	723	393,450	31.96
Bridgewater	26,200	20,801	5,399	1,521,690	73.17
Franklin	29,320	27,000	2,320	1,226,200	45.41
Hillsborough	36,993	34,000	2,993	1,534,640	45.14
Montgomery	20,468	19,008	1,460	564,208	29.67
N. Plainfield (Twp.)	7,300	6,335	965	362,415	57.20
Warren	12,402	12,124	278	366,050	30.19
9 Townships			16,936		
Sussex—					
Andover (Twp.)	14,000	12,195	1,805	203,015	16.65
Byram	18,612	16,153	2,459	230,100	14.25
Frankford	22,081	20,158	1,923	323,885	16.06
Fredon	12,000	11,283	717	117,675	10.43
Green	10,800	10,093	707	110,950	10.99
Hampton	17,100	14,920	2,180	103,215	6.92
Hardyston	21,794	20,573	1,221	302,115	14.69
Lafayette	11,677	10,920	757	183,025	16.76
Montague	28,166	26,374	1,792	151,839	5.76
Sandystone	27,002	23,801	3,201	118,200	4.97
Sparta	25,493	22,533	2,960	334,522	14.84
Stillwater	20,200	16,102	4,098	120,660	7.49
Vernon	43,949	39,968	3,981	386,775	9.67
Walpack	14,562	13,310	1,252	101,840	7.65
Wantage	43,128	36,000	7,128	410,905	11.41
15 Townships			36,181		
Warren—					
Allamuchy	13,166	12,265	901	200,770	16.37
Blairstown	20,363	17,639	2,724	160,020	9.07
Franklin	15,313	13,927	1,386	288,815	20.73
Frelinghuysen	15,206	14,492	714	172,217	11.88
Greenwich	7,083	6,002	1,081	236,506	39.42
Hardwick	11,304	12,445a		81,787	6.57
Harmony	15,345	13,925	1,420	262,750	18.87
Hope	19,627	18,475	1,152	266,700	14.43
Independence	12,905	11,208	1,697	225,695	20.13
Knowlton	16,171	15,074	1,097	203,603	13.51
Lopatcong	5,925	4,471	1,454	258,245	57.77
Mansfield	19,414	16,932	2,482	262,835	15.52
Oxford	4,400	2,968	1,432	135,440	45.60
Pahaquarry	13,118	11,129	1,989	75,615	6.80
Pohatcong	8,300	7,235	1,065	287,467	39.73
Washington (Twp.)	11,389	10,910	479	345,515	31.67
White	17,156	14,762	2,394	268,990	18.22
17 Townships			23,467		
196 Townships			639,935		

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a Error evident in assessment figures.

E.—MOSQUITOES.

Thru the work, scientific and practical, that has been done within the State since 1901 it has been demonstrated that the species which breed in our 296,000 acres of salt marsh, and may travel as much as forty miles inland, cause 95 per cent of our mosquito burden, yet are controllable at a reasonable cost.

Other forms are troublesome, but, as they do not travel so far as the salt-marsh species, are subject to local control. Few people realize the extent and importance of that control.

Thirteen counties are spending this year $213,585 for mosquito work and most of it is used, quite properly, in fresh water control. The State's entirely disproportionate and inadequate appropriation of only $10,000 is devoted entirely to the marshes. Perhaps the counties can and will rid their territory of the pests, tho those which have the most marsh are poorest in all else.

The accompanying map shows the breeding areas and the infested territory, indicates the control work already done and explains why so many of our farms and cities, as well as most of our coast resorts, are under the domination of the insects. The marshes of Bergen, Essex, Union, Middlesex and Monmouth counties have been so nearly completely drained that the original area of infestation is reduced to a fraction; those of Ocean and Atlantic counties are well advanced; Cape May has made a good beginning; but in Burlington, Cumberland and Salem about 100,000 acres—one-third of the whole salt marsh, are still untouched. In all there have been constructed approximately 12 million feet of ditches by which 95,000 acres of marsh are drained.

Attractive as is the suburban district about New York, there are assurances that it will develop immensely once the mosquitoes are abolished. The same is true of the shore resorts. The New Jersey mosquito is a positive deterrent to thousands of people who would like to visit our coast during the summer, and it is a well-established fact that farmers from other sections will not locate within the mosquito belt.

The damage done by the mosquitoes cannot be counted because it is represented by lost opportunities, backward towns, undeveloped resorts, abandoned farms; but the following estimate of what their control may yield within twenty years is believed to be reasonable:

Increase **in farm** values in eight South Jersey counties:	
631,000 acres, now farmed, advanced from $56 per acre, its present approximate average value, to $150 per acre = $94 per acre	$59 millions.
(The average value of farm land in Illinois (1910) was $95 per acre; in all New Jersey including improved, it was $48.23.)	
600,000 acres unproductive land, exclusive of marshes, advanced from present estimated value of $20 per acre to $100 per acre = $80 per acre	48 milions.
(The average assessed value of **all** land in Burlington County, including town sites, is $21 per acre (1916).)	
Increase in value of **shore property**	200 millions.
(This is an estimate based upon the assessed valuation in 1915 of all property along the coast at $247,328,490, and a calculation from official maps that barely 10 per cent of the territory is occupied).	
Increase in value of **suburban and industrial property,** mainly in the metropolitan district	200 millions.
(This is a conservative estimate. A portion of the Newark meadows assessed in 1912 at $1,428,000, and supporting 286 workers, was later freed of mosquitoes and in 1916 was assessed at $3,750,000, and supported 6,341 workers. Dr. L. O. Howard, the great authority on mosquitoes has said, "It would be a magnificent investment for New Jersey if it spent $250,000 a year for the next three or four years." And one of the Freeholders of Essex County is quoted as having said: "Real estate experts have stated that the benefits in property values which would result from the extermination of the mosquito in North Jersey would amount to at least a thousand million dollars").	
Total	$507 millions.

To this property gain may safely be added an increase in population, due to mosquito control alone, of at least five hundred thousand.

The direct cost involved is estimated at not more than $750,000, based upon the present average cost of ditching and the knowledge that there are 193,000 acres of marsh yet to be drained.

F.—POSSIBLE INCREASE IN ALL PROPERTY VALUES.

The attempt to estimate the growth of New Jersey as a result of any policy of development is beset with as many difficulties as there are influences affecting the situation. Some parts of the State are in the full tide of growth, others are sluggish or even retrograde. In one section we find a congested population; only a few miles away it is sparse.

In Appendix E it is shown that mosquito control will add so much to land values in South Jersey and along the coast that it is unnecessary to forecast the effects of other development efforts in that section, however important they may be.

The anticipated gain in *farm values* in thirteen counties in North Jersey may be estimated thus:

1,200,000 acres now farmed advanced from $76—the average value at the last census, to $150 per acre = $74 per acre	$88 millions.
400,000 acres unproductive land, exclusive of marshes, advanced from present approximate value of $30 per acre to $120 per acre = $90 per acre	36 millions.
Total	$144 millions.

Coincidently with any increase in farm values, due to whatever cause, is bound to be an advance in the ratables in the towns to which the farms are tributary. There are no data upon which to base an estimate of this increase, but to round out the total given on page 79 it may be fixed arbitrarily for the whole State at 249 million dollars.

Report of Special Committee on Washington Crossing Park.

By the Act of March 21, 1910, the Governor was authorized to appoint a Washington Crossing Commission, consisting of 50 persons, who as a body politic were given power to select and locate lands at McKonkey's Ferry, commonly known as Washington Crossing, in Mercer County, which in their judgment might be proper and necessary to be acquired by the State for the creation of a State Park. The Commission was given power to acquire these lands in the name of the State, and to lay out and create a Park and thereafter maintain it. The Commission was authorized to expend such sums of money as might be included in any appropriation bill for its expenses in carrying out the provisions of the Act, but it was not authorized to acquire lands unless an appropriation was made for that specific purpose.

Nothing was actually accomplished by the Commission appointed under this Act in the way of acquisition of lands, and evidently there was a marked change of purpose, as is evidenced by the passage in 1912 of Chapter 32 of the Laws of that year creating a new Commission with distinctly limited powers. The Commission contemplated by this Act was to be composed of the Governor, the State Comptroller, the State Treasurer, and five persons to be named by the Governor, who were authorized "to acquire by purchase or condemnation, in the name of the State, lands not to exceed 100 acres in extent at or near the point where Washington crossed the Delaware on the night preceding the Battle of Trenton, and with power to erect upon said lands, when acquired, a suitable monument of design and material to be by said Commission determined, commemorative of the crossing of the River Delaware by Washington as aforesaid, at a total cost, for the acquisition of said lands and the erection of said monument, not to exceed $25,000." The Commission was also authorized to fence, grade and improve the lands for maintenance as the Washington Crossing Park, "*provided* the entire cost, including the acquisition of said lands and the erection of said monument shall not exceed the sum hereby appropriated." By the annual appropriation act of 1912, the sum of $25,000 was appropriated for the purpose of carrying out the provisions of this second act. That the first act was repealed by the enactment of the second there can be no doubt.

The Commission constituted by the Act of 1912 employed Charles W. Leavitt as a landscape engineer to make a survey and plan for the proposed park, which plan is now hung on the wall of the Assembly corridor in the State House. This plan involves the acquisition of about 350 acres of land and its treatment for park purposes. Evidently, it is based upon the theory of the construction of a memorial bridge across the river by the Federal Government connecting with whatever improvement of like nature may be created on the Pennsylvania shore by the State of Pennsylvania. The plan submitted by Mr. Leavitt was formally adopted by the Commission, evidently with the idea that the two limitations contained in the Act from which it derived its power—first, the limitation to 100 acres, and second, to a total cost, including a monument, of $25,000—would be removed by a subsequent legislature. These limitations have not been removed and still control as fixed boundaries the execution of the projected memorial.

A brief description of the general features of the country in the indicated location may help to a comprehension of the situation as it now exists. At or near the place where Washington crossed the Delaware, the river bank is closely approached by the line of a highway known as the "River Road." A short distance back from the bank beyond the River Road is the Belvidere Branch of the Pennsylvania Railroad, next to that is the feeder of the Delaware and Raritan Canal Company, and just beyond the line of the feeder, the newly-constructed Delaware River Drive. On the Pennington Road, which intersects the River Road in this vicinity, and along the Delaware River Drive, are a considerable number of residences and one or two stores, representing a suburban development of some extent. When the present Pennington Road was opened apparently the old road which was the line of march of Washington's troops was abandoned. It can, however, be distinctly traced and located without doubt. Reference to the plan adopted by the Commission of 1912 will be found useful.

The plan prepared by Mr. Leavitt and adopted by the Commission of 1912 involved the acquisition of land on each side of the old road to the river bank, and included the acquisition of the old ferryman's house. A distinctive feature of the plan adopted was the line of march after the crossing had been completed.

The Commission of 1912, in accordance with this plan, acquired 100 acres of land from Ira J. Blackwell lying between the Pennington Road and the road which was the the line of Washington's march, bounding on each. The Blackwell farm consisted of about 107.8 acres, and it appears that Mr. Blackwell agreed to convey the balance of his farm to the State at the same rate which he received for the tract conveyed. There is, however, no instrument confirming this. The consideration mentioned in the deed of conveyance from Blackwell to the State is $18,000. In the accounts of the Commission this price is stated as $19,000. It is to be noted that this purchase did not include the road which was the line of Washington's march, and left still to be acquired about 250 acres of land in order to carry out the project contemplated in the Leavitt plan. The McKonkey Ferry-house was not included in this purchase, which, however, exhausted the Commission's power of land acquisition.

It appears that the Commission of 1912 entered into a contract for the erection of an inexpensive monument or the placing of a tablet, but before this detail was commenced the contract was revoked. Of the $25,000 appropriated for the purposes of the Commission, $22,391.99 was expended and the balance lapsed.

Subsequent to the Act of 1912, and the appropriation made for its execution, there has been no additional legislation, either by way of broadening the powers of the Commission, or of this Department, or appropriating additional money for the execution of any plan. It is only fair, however, to call attention to the fact that the Commission of 1912 applied to the Legislature for extension of its powers and the appropriation of additional sums of money and presented a bill or bills drafted to accomplish that result. The Legislature took no action upon these applications, and in this posture the matter was turned over to the Board of Conservation and Development at the time of its creation.

This Board, therefore, is confronted by the fact that its sole authority with relation to the Washington Crossing Park is limited to the acquisition of 100 acres of land, which has been completed, and to the expenditure of $25,000 for the acquisition of land, the creation of a park, and the erection of a monument, of which $22,391.99 has already been expended.

The Department was confronted immediately by the necessity of making some disposition of the property acquired which would ensure the care and preservation of the buildings upon it. No funds appropriated to the Department were available for this purpose, or for the purpose of any improvement or development upon the lands acquired. Without the power or the means to care for this property by any other method, the Department leased the tract to a farmer from year to year, upon terms which provide for maintenance and repairs in addition to a cash rental.

Meantime, the Department was endeavoring to determine the course which should be followed. That additional power would have to be sought from the Legislature was clear. The Department might recommend the completion of the plan adopted by the Commission of 1912, and ask for the necessary authority and appropriation. Or it might recommend an alternative plan. After a number of discussions the Board determined to visit the site, and as a body went to Washington Crossing and walked over and examined with care the location, the tract proposed to be enclosed by the plan of the Commission of 1912, and the relation of the tract acquired, both in respect to the plan of the Commission and any other possible scheme of development or improvement which might be adopted.

Before coming to any definite conclusion upon which to base a recommendation to the Legislature the Department believed it would be wise to attempt to develop an expression of public opinion insofar as there might be any general interest in the proposed memorial. It was accordingly determined to hold a public hearing and invite expressions from the citizens of the State as well as from the newspapers. Invitations were extended through the officers of a number of patriotic societies and orders to the members of those societies and orders, to appear at this hearing and give expression to their views. Notices of the holding of the hearing and its purpose were sent to practically every newspaper in the State, including some twelve or fifteen New York and Philadelphia papers having a general circulation in the State. While the notice sent out was, in a considerable number of instances, printed in full so that the place and purpose of the hearing were well advertised, there was very little expression of public opinion by way of editorial comment from outside Mercer County. This seemed to indicate to the Department that from the newspaper standpoint the matter was not one of significance or interest to the State at large. The attendance at the hearing was neither large nor generally representative of the State at large. With but very few exceptions, those present were residents of Mercer County and representatives of societies, orders and municipalities in Mercer County, and county residents representative of patriotic orders and societies. The conditions surrounding the Park project, existing by reason of the statutory limitations and the purchase already made, together with the plan of the Commission, were brought forward and explained. It was unquestionably the view of those who spoke that the Park should be developed along the lines of the plan of the Commission, or its general equivalent. The only plan brought forward for the financing of this project was that an organization might be formed outside the departmental organization which should attempt to collect a fund from the school children of the United States. As this lay entirely outside the powers and functions of the Department, the result of the hearing was of very little value except as it indicated a lack of interest on the part of the State at large.

Some time ago, as the Department is informed, an act was introduced in the Legislature of Pennsylvania contemplating the creation of a commission for the acquisition of land along the Pennsylvania shore having a relation to the crossing of the river by Washington's army similar to that of the proposed park lands in New Jersey. An appropriation act was passed by the Pennsylvania Legislature, but this effort came to no result for the reason that the appropriation act was vetoed and the commission not appointed. In 1917 the movement in Pennsylvania was renewed, resulting in the appointment of a commission and the passage and approval of an appropriation act, so that the State of Pennsylvania is for the first time in a position seriously to consider a development on the Pennsylvania shore. With this commission the Department of Conservation and Development is attempting to establish communication and cooperation. The Department has not yet learned of the adoption by the Pennsylvania Commission of any definite plan of development, or procedure thereto, but is prepared to join with it in considering the subject.

There does not seem to be among the records of the Commission of 1912 transferred to this Department any estimate of the cost of transforming these lands into a park, the relocation of the old road and the construction of walks and drives, and the other incidents of the plan of the Commission of 1912. It is significant, however, that the sum which the Commission of 1912 asked the Legislature to appropriate for the execution of the plan of the Commission of 1912, including the acquisition of the remaining land and the creation of a park, exclusive of the bridge approach, was $125,000. Undoubtedly this estimate was prepared with a complete and detailed knowledge of the cost involved by the adopted plan. Indeed, since the additional land to be acquired would cost at least $50,000, it is probable that this $125,000 was intended only to start the project, and that to complete it on the proposed lines would cost not less than $250,000. This would by no means end the expense to the State. The carrying charges involved in the maintenance of the park for superintendent, laborers and police protection we believe to be conservatively estimated, assuming this work to be properly performed, at not less than $10,000 a year.

This Department necessarily has a somewhat different attitude toward the Washington Crossing Park project than a commission specially and particularly charged by the Legislature with the duty as well as the power of executing a particular park plan. We believe that each of the several unfinished projects which were turned over to this department when it was created, as well as the other phases of the State work similarly entrusted to it, are subject to the general provisions of the act constituting this department, charging it generally with the conservation as well as the development of the resources of the State. It is apparent, therefore, that this Department cannot regard either the Washington Crossing Park or any similar project as an isolated undertaking, but must deal with it as but one of a number of enterprises which have a certain inter-relation and a proportionate value in the welfare of the State at large. In reaching any conclusion we are confronted by these facts:

1. That the existing grant of power has been entirely exhausted.

2. That the Legislature to which the Commission of 1912 applied for the additional grant of power and increased appropriation necessary to the completion of its adopted plan, refused to do either, inferentially at least, a rejection of the Commission's plans.

3. That so far as we could ascertain, there was little, if any, general State-wide interest in the extension of the proposed memorial beyond the limits imposed by the Act of 1912.

4. That the land purchased, in the main, was of value to the State only if the memorial park were completed along the lines of the plan of the Commission of 1912.

The result of our survey of these matters has led finally to a reluctance to recommend to the Legislature the completion of the Washington Crossing Park as contemplated by the Commission of 1912. If the State could, without hampering its other operations, afford the expenditure of the capital sum involved, and thereafter carry the annual maintenance charges, it is unquestionably true that an extensive development of this site with its historic connection would be justifiable. But in view of the limitations upon the State's financial resources, particularly at the present time when retrenchment and economy, both in public and private affairs is indicated, we cannot, as a State administrative body, ask for the additional expenditures indicated.

There is a possible alternative of development in the abandonment of the Commission plan, the purchase of the McKonkey ferryman's house, with a sufficient tract of land to ensure its protection, and the erection of a worthy and appropriate monument along the line of the Delaware River Drive which would indicate the location to travelers on that highway and draw their attention to the significance of the memorial. This would obviate the large capital account for the purchase of land and creation of park conditions, and the maintenance charge involved in the larger project would be reduced to a minimum. The land already purchased could, as we are advised, be sold to advantage and the proceeds, if appropriated by the Legislature, be used to reduce the expense of carrying out this less elaborate and more economical form of memorial.

The Department desires to state in the most unqualified way its entire and hearty approval of the plan to commemorate by a suitable memorial the crossing of the Delaware by Washington and his army. We believe that such a memorial should be erected by the State and paid for from State funds, and we disapprove entirely of the plan suggested at the hearing, of attempting to finance this memorial by collection from the school children of the United States, or any similar scheme.

Being convinced that a suitable memorial should be placed or created, the Department has included in its budget for the coming year a request for an appropriation of the sum of $25,000, which, if the necessary authorization can be obtained from the Legislature, it is the plan of the Department to expend in the erection of a monument along the line of the Delaware River Drive at the junction of that drive with the location of the now abandoned road used by Washington and his troops, with tablets commemorative of that event and calling the attention of the traveler along the highway thereto. In order to bring this matter definitely before the Legislature, the Department also proposes to ask, in connection with the authorization to erect this monument and tablets, for power to dispose of the land purchased by the Commission of 1912 and to use its proceeds for the acquisition of the McKonkey ferryman's house and a tract of land sufficiently large to ensure its surroundings and protection. Of course, the ultimate disposition of this matter lies in the will of the Legislature and whenever this legislative purpose is expressed, this Department will execute that direction within the means placed at its disposal for that purpose by law. We desire to make it clear that without legislative action nothing can be done except continue to hold the tract of land already owned by the State in its present condition as farm land.

Nelson B. Gaskill,
Charles Lathrop Pack,
Alfred Gaskill,
Committee.

Report of the State Firewarden

Charles P. Wilber.

THE FIRE SEASON.

The opening of the official year, November, 1916, found conditions not critical but unusually provocative of forest fires. The excess temperatures and deficiency of rain of the preceding autumn continued and the month was unusually mild and sunny. This continued for the first ten days of December, creating an unusually late danger season for fires. This, with the normal difficulties attending the fall forest conditions, and the opening of the gunning season, so aggravated the situation as to produce 18 per cent of the year's fires. A most unusual feature of the situation were the numerous, and in several instances serious, fires on December 6 and 7—unusually late dates.

Winter conditions, as always, brought relief from fires, which continued from mid-December until late March. The marked deficit of rain and snow and unusually clear weather with high winds throughout February presaged early difficulty, which, fortunately, was avoided by an exceptionally wet March. This month, however, was not only wet but uncommonly warm, the snow going ten days to two weeks earlier than customarily. Then the proverbial March winds prevailed with sunshine and dangerously dried out the woodlands before the month closed.

April opened with one of the hottest spring days in recent years and continued so throughout. Rarely, also, has this month had less wet weather; even the showers being markedly few and light. May, on the contrary, was an abnormally cold month, but likewise was a dry and windy one. Under such conditions foliation was unwontedly retarded and the physical situation in the woodlands made singularly favorable for burning. These circumstances, with spring clearing prevalent, with unseasonably pleasant weather to urge unusual activity in the forest both for business and pleasure, made a situation hazardous in the extreme. Of 871 fires recorded during the year, 610, or 71 per cent, burned during this period; and of 67 fires which burned 200 acres or more, 51 are charged to the spring season. March 29 to April 4 stands out as one of the scourge periods in the State's record, not comparable with, but in some measure similar to, the November, 1914, hunting season. But, despite the continuing drought of the entire spring, and the starting of many fires, those which became serious were only those quickly fanned by abnormal winds to difficult proportions.

June and July brought the relief of normal weather and full foliation and few fires were started, none of which were serious. August, on the contrary, was the driest save one in twenty years, the heat, drought and sunshine being abnormally pronounced; September, likewise, continued these drought conditions. Despite the favorable fire conditions, but few fires burned and but one of them reached dangerous size. October opened with dry weather also and until the heavy rain of the 24th continued the menace, but without serious difficulty and with few fires.

Again, as almost uniformly heretofore, the summary of the season emphasizes the part that the personal factor plays in determining the danger season. The late fall, with the open game season, and the spring with its "cleaning up," produced 89 per cent of all the fires and 90 per cent of those which burned as much as 200 acres. The numbers and percentages are as follows:

FOREST FIRES BY MONTHS

	No.	Per Cent of Total		No.	Per Cent of Total
November	106	12	May	237	27
December	55	6	June	28	3
January	10	1	July	3	—
February	19	2	August	21	3
March	92	11	September	11	1
April	281	33	October	8	1

Table 1—Forest Fires in 1917, and in Previous Years.

Years.	No. of Fires.	Total Acres Burned.	Acres per Fire.	Total Loss.	Loss per Fire.
No organized service, incomplete reports.					
1872,	....	100,000	....	$1,000,000	....
1880,	54	71,074	1,316	252,240	$4,671
1885,	....	128,000	....	1,128,000	....
1895,	49	66,120	1,349	600,000	12,245
1902,	65	98,850	1,520	169,323	2,605
1903,	79	85,046	1,076	305,744	3,870
1904,	81	41,530	512	193,413	2,388
Organized fire service.					
1907,	167	11,525	69	11,647	70
1908,	533	52,978	100	64,536	121
1909,	563	93,525	166	133,944	238
1910,	611	81,452	133	127,850	209
1911, Forest Fires, ..	289	64,404	122	86,940	165
Embryo Fires,†.	239				
1912, Forest Fires, ..	214	26,291	48	21,501	39
Embryo Fires,†.	331				
1913, Forest Fires, ..	311	53,823	77	67,205	99
Embryo Fires,†.	367				
1914, Forest Fires, ..	396	78,655	92	83,880	99
Embryo Fires,†.	451				
1915, Forest Fires, ..	549	150,258	147	209,090	207
Embryo Fires,†.	467				
1916, Forest Fires, ..	269	51,654	88	69,001	118
Embryo Fires,†.	314				
1917, Forest Fires, ..	486	92,479	106	79,335	90
Embryo Fires,†.	385				

† Burned less than 5 acres.

NUMBER AND AREA OF FIRES

(See Tables I and II.)

The total number of fires (871) reported during the year is a marked increase over that of all previous years except 1915. This is explained in part by the normal increase in the rural population with its greater menace, in part by stricter faithfulness of the local force in reporting all fires, in part by unusually trying climatic conditions, and somewhat because of the increased territorial scope of the Fire Service. Significantly also the stimulus to increased agricultural endeavor given by the war has aggravated the menace. Month for month, the number of fires this year is fewer than in the preceding year, save in December, for the reasons given on page 103, and in the three spring months when preparation for crops urged unusual numbers of people to use fire for disposing of waste growth from land long neglected. Moreover, among a large quota of ignorant or careless helpers there was lacking the care ordinarily exercised by one who regularly uses fire and knows the dangers and trickery of wind and dry ground surfaces.

Under conditions such as these it is encouraging to find that 45 per cent of the total fires were not allowed to burn 5 acres, and that but 10 per cent. reached really serious size. The increase in the total area burned over is not discouragingly larger than a year ago. Of 92,479 acres burned, one fire occurring in the first days of April under peculiarly trying conditions, and in a situation where poor means of transport and an inadequate number of men combined to render its control most difficult, covered 28,500 acres. Another 23,000 acres were added by 11 other serious fires in the spring season. Far more than one-half the burned area was covered by 12 large fires in remote regions and under the most difficult weather conditions.

Table II—Forest Fires by Relative Area Burned, and by Counties, 1917.

COUNTY.	NUMBER OF FOREST FIRES.					Total Embryo Fires (less than 5 acres).
	5-10 Acres.	11-100 Acres.	101-1000 Acres.	Over 1000 Acres.	Total.	
North Jersey—						
Bergen, ...	7	16	..	..	23	24
Hunterdon, ...	1	1	..	..	2	..
Morris, ...	17	39	6	..	62	45
Passaic, ...	10	32	6	..	48	23
Somerset, ...	7	12	..	..	19	15
Sussex, ...	4	21	5	..	30	34
Union, ...	1	3	3	..	7	1
Warren, ...	2	5	..	..	7	24
Fires that burned in more than 1 county,	..	..	1	..	1	..
Totals, ...	49	129	21	..	199	166
South Jersey—						
Atlantic, ...	23	36	18	3	80	54
Burlington, ...	5	9	7	3	24	6
Camden, ...	8	17	6	1	32	28
Cape May, ...	5	12	1	..	18	9
Cumberland, ...	13	23	10	1	46	25
Gloucester, ...	3	4	3	..	10	7
Mercer, ...	..	..	..	..	..	1
Middlesex, ...	6	15	3	..	24	15
Monmouth, ...	5	9	4	..	18	30
Ocean, ...	6	15	5	1	27	42
Salem, ...	1	3	..	..	4	2
Fires that burned in more than 1 county,	..	1	1	2	4	..
Totals, ...	75	144	58	11	287	219
State Totals,..	124	273	79	11	486	385
Per cent. of State Totals, ...	14	31	9	1	55	45

CAUSES OF FIRES

(See Table III.)

Railroads.—The fires set by railroad locomotives numbered 343, or 39 per cent. of all the year's fires, but little increase above the average number of the last five years. This year again more than half (60 per cent.) of the railroad fires were not allowed to burn 5 acres, whereas more than half of those in each other class did reach that size. Proper care in maintaining and operating locomotives would reduce fires from this cause to a proportion far below the present average, if it did not make them practically negligible. Until a more helpful interest is aroused in the operating departments of the railroads the number of fires set by them will not materially decrease. But each year the co-operation of those in whose charge are the rights-of-way, curtails the number of railroad fires which reach serious size and reduces the total area so burned.

Brush Burning.—As is to be anticipated because of the situation described on page 103, the forest fires that are known to have started from brush fires increased both in number and in proportion to the total. Of 92 fires known to have come from these clearing up and camp fires, definite responsibility has been fixed for 81, which is to be credited in large part to the operation of the law requiring permits. (See p. 117.) The campfire phase of this class is separately considered on page 118.

Smokers.—The number of fires known to have been caused by careless smokers is larger than that of last year but less in proportion to the whole number. Unfortunately, however, this cannot be construed to indicate that smokers' fires are a less serious factor than they have been heretofore. The very nature of their origin and the universal but transient character of the smokers makes their determination most difficult. The annual fluctuation in the proportions so fixed seems to be due rather to chance than to materially altering conditions. In recognition of this fact, and realizing that the avoidance of these fires must come through universal interest and the care of each individual smoker, a special effort has been planned for the ensuing season through a new poster (see fig. 18) dealing with this specific problem.

Sportsmen.—During the year past, the gunners' camp fires have played their part in the fire situation. Likewise the unsportsmanlike use of fire, or, in some sections, of brimstone tapers, to smoke out game, and the illegal use of fire by coon hunters are known to have been a factor in the question. But if each fisherman or gunner could be sent into the woods and fields without tobacco, the primary and the most difficult feature of the situation would be removed. Through ignorance, carelessness, or indifference the smoking sportsman presents a separate and serious fire problem. The late November, and especially the unusual early December (1916) fires mentioned on page 103 are ample evidence of the peculiar threat from this class of fires. And the fact that each year the same situation is encountered with the opening of the small game season, unless weather conditions make fires impossible, adds further evidence. The recurrent spring fires along streams and lakes when the fishing season opens likewise tell the same story. Curtailment of the difficulty there can be and there is increasingly. Control of the fires so started grows more effective, but adequate prevention of the sportsmen's annual inroad on their own sport, and on private and public interests through fire, must come by means of an awakened and insistent demand from their own ranks for relief from their worst enemy. The problem of camp fires is discussed on page 118.

Miscellaneous.—The use of matches and fire as playthings by children always causes its small quota of fires. The only apparent remedy for this is persistent emphasis on its danger by parents and teachers. (See also page 112.) The operation of steam tractors and similar engines on highways traversing woodlands will continue to make some trouble until the coal burner is replaced. Light narrow-gauge railroads, both temporary and more permanent, operating in and along forest areas give anxiety as each dry period comes on. Remedial measures partially meet the situations as they occur, but prevention must depend largely upon the substitution of oil burning or internal-combustion engines for those using coal or wood fuel.

Table III—Forest Fires by Causes and Counties, 1917.

County.	NUMBER.													
	Locomotive.		Brush Burning.		Smokers.		Sportsmen.		Miscellaneous.		Unknown.		Totals.	
North Jersey—	FF	eF	FF	eF	FF	eF	FF	eF	FF	eF	FF	eF	FF	eF
Bergen,	5	13	1	1	1	...	1	...	1	1	14	9	23	24
Hunterdon,	1	...	...	...	...	...	1	...	...	...	...	...	2	...
Morris,	18	12	6	3	3	5	7	5	8	3	20	17	62	45
Passaic,	23	13	...	2	3	1	3	2	1	...	18	5	48	23
Somerset,	3	1	4	7	2	1	...	...	5	1	5	5	19	15
Sussex,	11	22	2	1	1	3	5	2	...	1	11	5	30	34
Union,	1	...	...	1	...	...	2	...	1	...	3	...	7	1
Warren,	2	20	...	...	...	1	2	1	...	...	3	2	7	24
Fires that burned in more than 1 county.	...	...	...	...	...	...	...	...	1	...	...	...	1	...
Totals,	64	81	13	15	10	11	21	10	17	6	74	43	199	166
South Jersey—														
Atlantic,	26	30	16	2	5	1	3	1	8	9	22	11	80	54
Burlington,	3	...	3	1	1	...	...	...	6	3	11	2	24	6
Camden,	13	18	4	...	2	4	1	...	1	1	11	5	32	28
Cape May,	5	6	2	...	1	1	2	...	3	...	5	2	18	9
Cumberland,	5	10	11	5	3	4	...	...	6	3	21	3	46	25
Gloucester,	2	4	4	1	...	...	...	...	1	1	3	1	10	7
Mercer,	...	...	...	...	...	...	...	...	...	...	...	1	...	1
Middlesex,	2	2	4	...	2	...	2	3	...	...	14	10	24	15
Monmouth,	5	23	3	...	2	2	1	...	2	4	5	1	18	30
Ocean,	8	33	3	1	4	3	...	2	3	1	9	2	27	42
Salem,	1	1	2	1	...	...	1	...	...	...	...	...	4	2
Fires that burned in more than 1 county,	1	...	1	...	...	...	...	...	1	...	1	...	4	...
Totals,	71	127	53	11	20	15	10	6	31	22	102	38	287	219
State Totals,	135	208	66	26	30	26	31	16	48	28	176	81	486	385
Per cent. of State totals,	39		11		6		5		9		30		55	45

FF—Forest Fires.
eF—Embryo Fires (less than 5 acres).

THE FOREST FIRE SERVICE.

ORGANIZATION.

State Firewarden	1 Division Firewarden **Territory State-wide**	Federal Fire Patrol **North Jersey Only**	9 Patrolmen 1 Lookout
	1 Division Firewarden **Division A** **North Jersey**	63 Township Firewardens	55 District Firewardens
	1 Division Firewarden **Division B** **Central Jersey**	37 Township Firewardens 1 Forest Fire Lookout	53 District Firewardens
	1 Division Firewarden **Division C** **South Jersey**	45 Township Firewardens 1 Forest Fire Lookout	73 District Firewardens

Total: 5 State Firewardens; 145 Township Firewardens; 186 District Firewardens; 9 Patrolmen; 3 Lookouts.

THE STATE FORCE.

The reapportionment of the State last year creating three instead of four divisions, thereby releasing one Division Warden for Statewide service, has proven of pronounced advantage. Under the unusual conditions of the spring season the added flexibility was most fortunate. Moreover, the new organization avoided what otherwise would have been a seriously embarrassing situation when the Division Firewarden in charge of the North Jersey area was withdrawn by summons to military service. By the curtailment of projected extensions and new activities and because of the lesser menace in that territory during the summer months, the vacancy in the North Jersey Division was maintained until the opening of the fall season. With the beginning of the danger period it became impossible to continue to administer it directly from the State office and the vacancy was filled.

Despite a far more active season in actual direction of fire fighting the State wardens have maintained a more widespread patrol for fires and violations of the law than heretofore. The greatly increased number of violations fixed (see p. 117) and the promptness and effectiveness of the disposal of the cases is also a reflection of the closer touch on the local situation which the State organization has made possible.

Through the State force particular effort has also been made to place fire warning notices more generally throughout the woodland sections.

Three-year term.—The new provision for a three-year term for local wardens required unusual care to secure appointments of more accessible men where changes could be made, and to weed out still further the less active and less competent incumbents.

Publications.—A revision of the Forest Fire Manual, a Township Officials' Handbook, dealing with Fire Service business, and the annual printed List of Firewardens have been published.

Junior Assistants.—To stimulate interest and reward activity in forest fire prevention and control a Junior Forest Fire Assistant badge has been provided. These badges (see fig. 18) are issued free as a reward of merit to any boy or girl in the State who renders some worthwhile service in preventing or controlling a forest fire, or in apprehending violations of the fire law. Altho as yet not widely advertised, there have been distributed 53 badges to boys and 13 to girls, in every instance for active fire-fighting assistance.

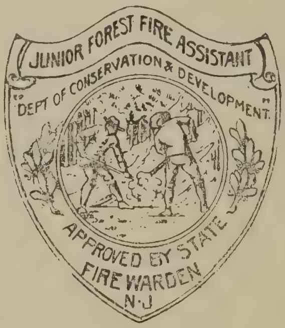
JUNIOR FOREST FIRE ASSISTANT
DEPT OF CONSERVATION & DEVELOPMENT.
APPROVED BY STATE
FIRE WARDEN
N·J

Fig. 18. Junior Forest Fire Assistant Badge.

Lookouts.—By the erection of a handsome and complete watch tower near its watershed property, Atlantic City has made possible the institution at McKeetown, Atlantic County, of the first permanent Forest Fire Lookout in South Jersey. The tower was not completed in time to permit its use for the spring season, but has since amply proven its value in controlling the summer and fall fires. Because of its location on one of the main shore roads it also has been of great value as a means of arousing intelligent interest in fire prevention in the large number of visitors. (See fig. 21.)

The erection of a sightly watch tower at the new army cantonment, Camp Dix, suggested its usefulness for forest fire control and through the ready co-operation of the Commandant, the sentry always maintained at this point now furnishes another permanent fire lookout for the adjacent forest area.

The fire lookouts at Batsto, Burlington County, and at Cedar Pond, Passaic County (See p. 114) have been continued as heretofore.

LOCAL ORGANIZATION

Because of the unusually busy fire season and the large volume of work which it created, and with the curtailed State force, considerable desired extension of the local service had to be postponed. However, in four townships, Harmony, Warren County; Hillsborough, Somerset County; Hopewell, Mercer County; and Ocean, Mommouth County, the fire service was installed. The work, therefore, now is organized in 147 townships, with 331 local wardens enrolled, four more than in the previous year.

Despite the numerous changes in personnel because of the impending three-year term for local wardens, there has been a lower percentage of new names on the record than heretofore. The Service is constantly striving for that stability in its local force which is the major factor in determining its ultimate efficiency. As each year shows less of change among the local wardens, it is felt that definite progress is being made in this respect. Also the emphasis placed on the increased efficiency of wardens who have telephone connection has increased again the number that are so served. The local interest and support the Service enlists is somewhat reflected in the fact that twenty-one wardens in seventeen townships are regularly appointed, but serve without pay.

Five men from the local force have been enrolled for military service.

Telephone help.—The heartiest acknowledgment is again made of the effective cooperation of the telephone companies of the State. As instituted through the Bell Telephone Company a year ago, this plan now lists with each central operator in the forest sections the name of one firewarden with connection from that office through whom every forest fire call is assured prompt attention.

Badges.—The badges heretofore used by the local wardens, which were of stock pattern and largely unfit for service, were called in and a new emblem of original design issued in their stead. (See fig. 19.)

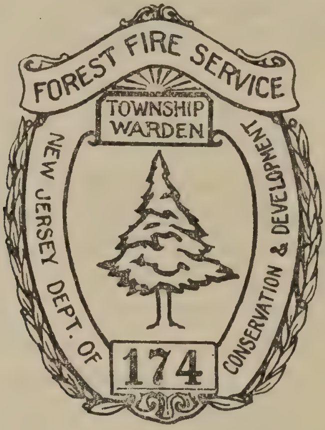
FOREST FIRE SERVICE
TOWNSHIP WARDEN
NEW JERSEY DEPT. OF CONSERVATION & DEVELOPMENT
174

Fig. 19. New Firewarden Badge.

Rural mail patrol.—Continuing the cooperation first operative in 1912 the United States Post Office Department designated its rural mailmen to serve as fire patrolmen. Each mailman traversing the wooded and adjacent sections was again supplied with a list of the wardens available in his territory giving the promptest means of access to them. Through this agency an adjunct of growing value in assuring prompt and therefore more efficient attention to fires has been continued.

FEDERAL PATROL

Through the so-called "Weeks Law" the Federal Government continued the $2,000 fund allotted annually to this State for forest fire patrol. Under the law the fund is available for use only in North Jersey.

Early in April the Lookout Watchman, provided for from this fund, took up work at the Cedar Pond station on the Newark City

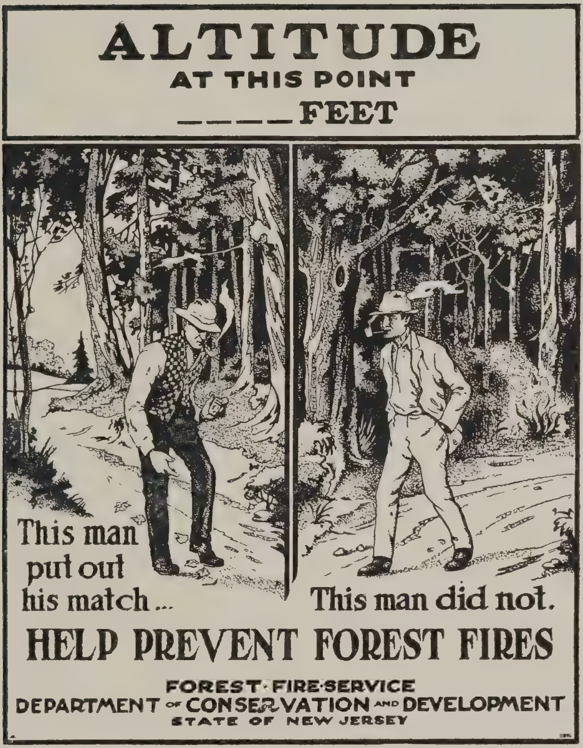
ALTITUDE
AT THIS POINT
____FEET
This man put out his match...
This man did not.
HELP PREVENT FOREST FIRES
FOREST FIRE SERVICE
DEPARTMENT OF CONSERVATION AND DEVELOPMENT
STATE OF NEW JERSEY

Fig. 20. FOREST FIRE POSTER WITH ALTITUDE HEAD. These are Displayed in All Parts of the State and Give Accurate Local Elevations Above Sea Level.

watershed. From then until the first of December he has been continuously on duty in the tower provided by the city.

With the opening of June an automobile patrolman was appointed whose routes traversed the major portion of the North Jersey forest areas. This patrolman has likewise continued to December first. Supplemental to this, 9 other patrolmen have been on duty till December, 5 from the first open date for bird shooting in October, with 4 additional from November 10, when the small game season opened. By this provision the more troublesome areas have been patrolled during the dry period of the gunning season.

Each season's experience with this work since its beginning in 1911 has further proven its great value as a forest fire deterrent and for effective fire control.

VALUE OF THE SERVICE

In the year just closed the Fire Service records show that improved properties, crops, cranberry bogs and forest products to the value of at least $250,000 have been saved from destruction by forest fire. The list includes homes, industries, school houses, whole communities, farm establishments and public improvements. As has before been pointed out, the forest values preserved by the Fire Service annually are enormous, but the closest estimate of their amount cannot but be vague and no attempt is made to set a figure upon them. Few fires are so innocent of harm that there is no measurable salvage when they are controlled promptly. It is fire protection alone that is redeeming the State's forest resources and their allied benefits, and which guarantees for the future their continuance and productiveness.

NEEDS OF THE SERVICE

There are two factors in forest fire prevention and control on which too great emphasis cannot be laid; viz., fire lookouts (see fig. 21) and fire patrol. Each has its limitations and each its peculiar advantages. The permanent forest fire lookout man effectively covers a wider area than a patrolman. He has his whole territory continuously under his eye, is more certain to see all fires promptly, is better able to locate them surely and to judge of their possibilities. He can better follow their progress for suggestion and advice and is more certain of reaching a warden promptly. But he seldom, if ever, can fix responsibility, and his influence as a deterrent is largely restricted.

The patrolman will fail to see many fires, will find others only after they have gained headway, and, like the fire fighters, is handicapped in judging the progress of a large fire. Often also he must lose time in getting word to a warden. But he is so placed that he should best be able to establish the cause, and by wider personal contact is better fitted to serve as a deterrent and informing agent. The lookout plant of tower, tower house, telephone and equipment is expensive, but is permanent. The patrolman's equipment for transport soon deteriorates and is a continuous outlay.

New Jersey needs both. Wilderness conditions or all-the-year menaces in some sections can only be served effectively and with economy by lookouts. Other areas, where the forest fire danger is more local or occurs at fixed periods, call for patrol solely or in addition to a watcher. The work done in limited sections by the State's wardens has emphatically proven that the annual spring scourge of fires from brush burnings can be controlled by patrolmen. But until expansion is possible to make such patrol general each season, chance and the weather will continue largely to determine how many fires shall start. The spring brush burning and fishing season, and the fall gunning period will remain uncertain times until a systematic patrol is available.

The increasing proportion of each year's fires which are cut off while small, is ample testimony to the effectiveness of the local force in fire control. But curative measures must be found if the number of fires starting is to be markedly reduced. It is certain that the means are available, despite the increasing population, both transient and permanent; it remains to place them at the disposal of the Fire Service.

VIOLATIONS

It is a violation of law to be responsible for any forest fire whether by ignorance, by accident or by intent. (See p. 117.) Experience has shown that the most potent preventative against fires is insistence on strict accountability for those that do burn. It is the fixed policy of the Fire Service to so administer this provision of the law that, so far as may be, each fire which burns shall serve to inform and caution those who might be responsible for others. Measured by this standard the season just closed marks an emphatic advance. With a total number of fires reported greater than for any year of record but one, the highest percentage in the history of the Service, 51 per cent., have been definitely fixed upon the offender. In 446 cases those responsible for forest fires have been held to account. In addition to these instances, 67 violations of the permit law, from which no forest fire resulted, were recorded.

Responsibility for these violations is divided as follows: 67 per cent. were due to railroads; 29 per cent to brush burnings; 1 per cent. to smokers and 3 per cent. to miscellaneous causes. The present status of the work shows 383 of the total 508 cases disposed of. The 125 cases still pending involve 78 railroad fires, the settlement of which should be complete by January 1, and 47 fires from other causes, the date for final disposition in the greater number of which should close them before the new calendar year. The 134 cases remaining unsettled from previous years have been disposed of save in 6 instances. The penalties collected during the year amounted to $2,646.07, of which $1,694.56 was paid by the railroads and $951.51 by other agencies.

AN IMPORTANT COURT DECISION

By an opinion of the New Jersey Court of Errors and Appeals, filed November 20, 1916, a long-contested construction of the application of the Forest Fire law to most forest fire cases was determined in favor of the State. A fire, legally set by the defendant under a permit to burn his meadow, was caught by a sudden shift of the wind and carried beyond his control. Inasmuch as his responsibility for the resulting forest fire was quite accidental and beyond the control of reasonable precaution the defendant declared himself not liable under the law. The case was first heard before a Justice and a verdict given for the State. On appeal to the Common Pleas Court this judgment was reversed and a non-suit declared. On review by the Supreme Court this decision was affirmed. In the final decision of the Court of Errors and Appeals this decision was reversed and the rule established that liability under the law is imposed on any one who causes a forest fire, whether by accident, ignorance or intention; the purpose of the act being to remove the cause of forest fires.

CAMP FIRES

Under the forest fire law it is not lawful to build a fire in or near the woods without a written permit from the local warden. Accepted as necessary when required, but as a needless and irksome provision in most municipalities upon its installation, this provision has clearly proven its value as a fire preventative and stands heartily endorsed upon acquaintance. But this endorsement by residents, whether they need or need not make use of fire themselves, does not find a response in those who use fire as a recreative agent and whose status is that of transients.

Emphatically, and quite properly, it is asserted in the administration of the law that no right is assumed to authorize a permittee to invade a private property right. A refusal to issue a permit for use on property not controlled by the permittee must of necessity restrict the use of fire by the transient camper.

Deer hunters.—Among those so affected, and who frequently used fire illegally, probably no single group was more numerous or a greater menace than the deer hunters. Realizing this, a patrol, restricted in its scope and cursory in nature because of the small available force and limited funds, was made during the four deer hunting days of 1916. The three patrols found camps in great abundance and violations of the permit law involving 136 gunners in the six townships visited. It also appeared to be generally assumed that such camps were necessary to successful sport and that campfires were indispensable. The fires found were many of them amply safeguarded and under a careful watch, but quite as often unnecessarily large and dangerous, or entirely deserted while still burning briskly.

As wide publicity as possible was given to the facts and remedial suggestions offered personally and through the press. A renewal of this publicity effort was made before the opening of the 1917 season with the announcement of an extended and intensive patrol. A thorough scouting of the entire area frequented by deer hunters the past fall disclosed but few camps and no camp fires, despite

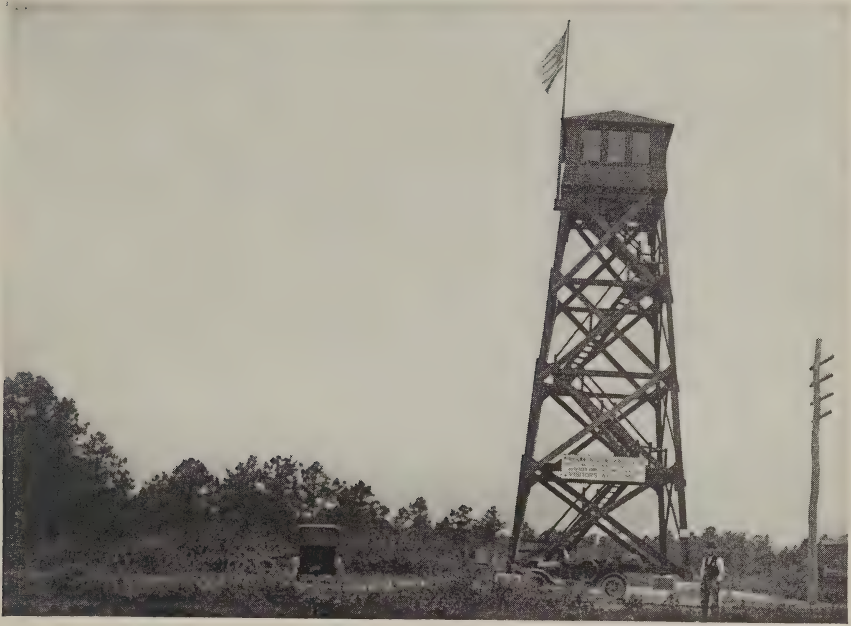

Fig. 21. A Forest Fire Lookout. Tower Maintained at McKeetown, Atlantic County, in Cooperation with Atlantic City, to Discover and Report Forest Fires Quickly.

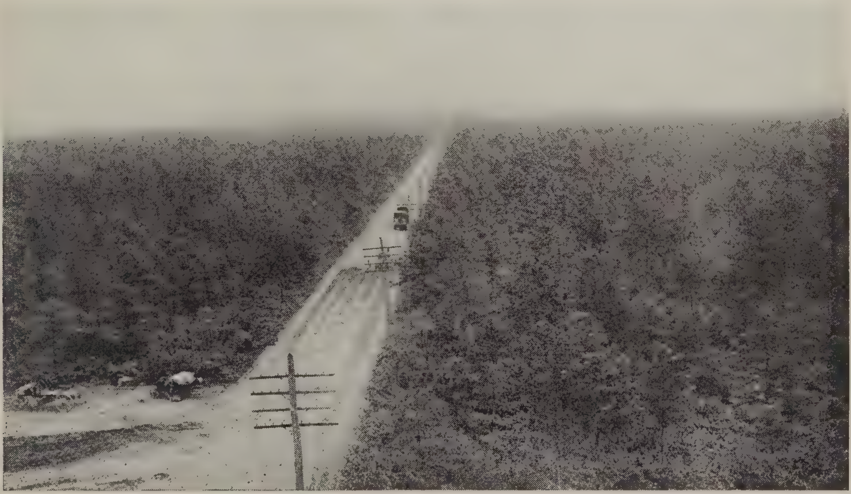

Fig. 22. A Part of the Country Under Observation from McKeetown Lookout.

the fact that on the opening day an unusually large number of deer hunters were in the woods. Only two fires, built by early comers in the morning for warmth, were found by a large force of patrolmen. The universal testimony appeared to be that nearby hotel or farm house accommodations were far preferable to open camps. In the few camps found, oil stoves under canvas were used in place of open fires. Due recognition should be and is gladly made of the ready spirit of cooperation evidenced by the deer hunters in their prompt response to the appeal and the suggestions made for remedying a dangerous situation.

Fishermen.—A less aggravated condition, but one more difficult to overcome, is presented by those who frequent our streams, lakes and ponds for fishing. The use of the camp fire in such situations, especially by the early morning and late evening fishermen, has created much trouble from forest fires. Such situations are far less susceptible of adequate patrol than the big game season because of their scattered locations and sporadic appearance through a long fishing season.

Picnickers.—The hiker, picnicker, canoeist or other similar pleasure seeker presents another phase of the campfire problem. Each year the closer supervision of all use of fire throughout the wooded sections, and the application of the permit requirement in these areas, curtails the use of fire for purposes of recreation. This seems to many an unnecessary and unfortunate infringement on the freedom of the out-of-doors pleasure seeker, and a detriment to the unquestionably desirable and increasing tendency of the city dweller to seek rest and recreation in the open. New Jersey, with its dense population and central location among still more densely peopled areas, and with easy access to even its remoter sections, is not in any sense a wilderness State: it has outgrown the conditions and must throw off the habits of that status. The numerous fires escaping annually from camps, campfires and bonfires of all classes, the many fires of similar nature unwisely built, or left untended but found before they have escaped, preclude beyond all possibility the exclusion of such fires from the local permit safeguard. The Fire Service therefore declines all requests for general permits and asks every citizen to observe the requirement to get local permits at whatever personal inconvenience.

Table IV—Forest Fires by Counties and Townships, 1917.

County and Township.	Number.		Acres Burned.	Loss to Forests and Other Property.	Cost to Extinguish.	Paid by.†		
	Forest Fires.	Embryo Fires.				Township.	State.	Offenders.
Atlantic County—								
Absecon (City),	...	2	......	....	$10.00	$5.00	$5.00	....
Buena Vista,	13	6	1,190	$1,520.00	129.30	30.87	30.88	$74.55
Egg Harbor,	7	2	1,635	1,079.00	192.70	94.35	94.35	4.00
Egg Harbor (City),	4	6	63	65.00	82.00	41.00	41.00	....
Folsom,	...	...	......	....	....	....	....	....
Galloway,	16	22	632	525.00	263.20	42.32	42.33	178.55
Hamilton,	14	2	7,272	2,595.00	495.85	240.42	240.43	35.00
Hammonton,	11	6	1,677	2,130.00	307.35	146.18	146.17	15.00
Linwood,	...	...	......	....	....	....	....	....
Mullica,	12	4	4,348	3,695.00	325.21	71.86	71.84	176.51
Northfield (City),	...	...	......	....	....	....	....	....
Pleasantville,	...	...	......	....	....	....	....	....
Port Republic,	3	...	232	500.00	49.90	24.95	24.95	....
Weymouth,	6	5	258	150.00	155.90	63.89	63.90	29.21
Total,	86	55	17,307	$12,259.00	$2,011.41	$760.84	$760.85	$512.82
Bergen County—								
Franklin,	5	1	105	$165.00	$102.60	$34.25	$34.25	$34.10
Hohokus,	3	5	61	61.00	45.20	18.10	18.10	9.00
Montvale (Boro.),	6	2	140	180.00	48.00	13.50	13.50	21.00
Oakland (Boro.),	2	12	125	110.00	170.10	77.56	77.54	25.00
Park Ridge (Boro.),	5	...	80	75.00	22.00	11.00	11.00	....
Ridgefield (Boro.),	1	4	15	17.00	18.00	9.00	9.00	....
Woodcliffe Lake,	1	...	20	12.00	6.00	3.00	3.00	....
Total,	23	24	546	$620.00	$411.90	$166.41	$166.39	$89.10
Burlington County—								
Bass River,	2	1	3,900	$2,700.00	$74.40	$32.50	$41.90	....
Evesham,	...	...	......	....	....	....	....	....
Medford,	4	...	840	1,365.00	100.43	50.21	50.22	....
New Hanover,	1	...	10	10.00	4.00	2.00	2.00	....
Pemberton,	2	2	180	130.00	44.50	9.95	12.95	$21.60
Shamong,	2	1	875	450.00	18.60	9.30	9.30	....
Southampton,	1	1	40	15.00	10.15	5.08	5.07	....
Tabernacle,	4	...	3,070	1,800.00	85.95	37.97	37.98	10.00
Washington,	...	1	......	....	5.00	2.50	2.50	....
Woodland,	9	1	3,617	1,345.00	316.40	75.45	110.75	130.20
Total,	25	7	12,532	$7,815.00	$659.43	$224.96	$272.67	$161.80

Table IV—Forest Fires by Counties and Townships, 1917—Continued.

County and Township.	Number.		Acres Burned.	Loss to Forests and Other Property.	Cost to Extinguish.	Paid by.†		
	Forest Fires.	Embryo Fires.				Township.	State.	Offenders.
Camden County—								
Berlin,	3	1	28	$20.00	$29.00	$3.50	$3.50	$22.00
Chesilhurst (Boro.),	...	3	......	....	29.45	13.85	13.85	1.75
Clementon,	2	1	90	65.00	31.00	8.50	8.50	14.00
Delaware,	...	2	......	....	9.10	4.55	4.55	....
Gloucester,	6	2	417	190.00	92.02	44.01	44.01	4.00
Voorhees,	1	...	15	10.00	13.25	6.62	6.63	....
Waterford,	4	3	1,255	615.00	95.00	43.00	43.00	12.00
Winslow,	17	17	1,041	890.00	307.20	46.37	46.38	210.45
Total,	33	29	2,846	$1,790.00	$606.02	$170.40	$170.42	$264.20
Cape May County—								
Dennis,	1	1	200	$180.00	$33.00	$16.50	$16.50	....
Lower,	2	2	20	15.00	27.00	5.00	5.00	$17.00
Middle,	8	4	111	85.00	105.50	23.63	23.62	58.25
Upper,	5	1	245	135.00	49.00	16.50	16.50	16.00
Woodbine (Boro),	2	1	50	45.00	15.50	7.75	7.75	....
Total,	18	9	626	$460.00	$230.00	$69.38	$69.37	$91.25
Cumberland County—								
Commercial,	4	...	93	$80.00	$55.65	$22.38	$22.37	$10.90
Deerfield,	6	1	1,394	645.00	59.70	22.10	22.10	37.00
Downe,	2	...	1,115	1,800.00	82.20	41.10	41.10	....
Fairfield,	3	1	100	95.00	94.40	39.70	39.70	15.00
Landis,	12	8	1,889	555.00	319.25	134.84	134.81	136.85
Lawrence,	...	2	......	....	12.75	2.38	2.37	8.00
Maurice River,	6	1	314	480.00	94.85	40.92	40.93	13.00
Millville (City),	13	12	1,820	1,871.00	459.95	197.38	197.37	80.00
Total,	46	25	6,725	$5,526.00	$1,178.75	$500.80	$500.75	$300.75
Gloucester County—								
Clayton (Boro.),	...	1	......	....	$5.00	$2.50	$2.50	....
Elk,	...	2	......	....	7.25	....	....	$17.25
Franklin,	5	1	280	$170.00	67.05	11.45	11.45	52.20
Monroe,	5	3	789	480.00	75.25	26.62	26.63	32.50
Washington,	1	...	500	500.00	12.70	....	....	12.70
Total,	11	7	1,569	$1,150.00	$167.25	$40.57	$40.58	$114.65
Hunterdon County—								
Bethlehem,	...	...	......	....	....	....	....	....
Lebanon,	2	...	24	$30.00	$36.10	$18.05	$18.05	....
Tewksbury,	...	...	......	....	....	....	....	....
Total,	2	...	24	$30.00	$36.10	$18.05	$18.05	....

Table IV—Forest Fires by Counties and Townships, 1917—Continued.

County and Township.	Number.		Acres Burned.	Loss to Forests and Other Property.	Cost to Extinguish.	Paid by.†		
	Forest Fires.	Embryo Fires.				Township.	State.	Offenders.
Mercer County—								
Hopewell,	...	...	......	....	....	....	....	....
Princeton,	...	1	......	$5.00	$12.00	$6.00	$6.00	....
Total,	...	1	......	$5.00	$12.00	$6.00	$6.00	....
Middlesex County—								
East Brunswick,	7	1	272	$150.00	$42.50	$16.75	$16.75	$9.00
Madison,	8	1	520	510.00	179.90	54.05	54.05	71.80
Monroe,	1	...	1,000	100.00	9.20	4.60	4.60	....
Sayreville,	4	13	82	55.00	106.65	53.33	53.32	....
South Brunswick,	4	...	200	160.00	31.15	14.58	14.57	2.00
Total,	24	15	2,074	$975.00	$369.40	$143.31	$143.29	$82.80
Monmouth County—								
Atlantic,	1	3	200	$250.00	$45.15	$21.08	$21.07	$3.00
Freehold,	1	...	206	200.00	44.90	22.45	22.45	....
Howell,	8	26	134	173.00	305.60	45.20	45.20	201.20
Middletown,	...	...	......	....	....	....	....	....
Ocean,	...	...	......	....	....	....	....	....
Shrewsbury,	5	...	313	190.00	64.60	23.45	23.45	17.70
Wall,	3	1	190	165.00	26.77	2.00	2.00	22.77
Total,	18	30	1,043	$978.00	$487.02	$114.18	$114.17	$244.67
Morris County—								
Boonton,	2	8	11	$16.00	$81.85	$35.73	$35.72	....
Chester,	2	3	15	15.00	19.00	3.00	3.00	$13.00
Denville,	4	...	266	365.00	41.50	11.85	11.85	17.80
Hanover,	8	14	323	570.00	277.00	122.50	122.50	32.00
Jefferson,	2	...	55	55.00	29.00	14.50	14.50	....
Mendham,	...	...	......	....	....	....	....	....
Montville,	3	1	148	70.00	53.75	15.88	15.87	22.00
Morris,	5	5	41	30.00	93.00	33.50	33.50	26.00
Mt. Arlington,	...	...	......	....	....	....	....	....
Mt. Olive,	3	1	145	547.00	81.80	14.00	14.00	53.80
Passaic,	...	...	......	....	....	....	....	....
Pequannock,	8	3	155	160.00	143.65	38.33	38.32	67.00
Randolph,	7	...	220	280.00	186.00	21.60	21.60	147.80
Rockaway,	10	8	540	575.00	212.30	90.65	90.65	31.00
Roxbury,	4	3	549	275.00	119.65	34.32	34.33	51.00
Washington,	5	...	271	447.00	165.55	59.62	59.63	46.30
Total,	63	46	2,739	$3,405.00	$1,504.05	$495.48	$495.47	$507.70

Table IV—Forest Fires by Counties and Townships, 1917—Continued.

County and Township.	Number.		Acres Burned.	Loss to Forests and Other Property.	Cost to Extinguish.	Paid by.†		
	Forest Fires.	Embryo Fires.				Township.	State.	Offenders.
Ocean County—								
Berkeley,	2	7	85	$274.00	$71.05	$24.60	$24.60	$21.85
Brick,	3	...	1,200	1,300.00	100.30	35.40	35.40	29.50
Dover,	4	2	236	685.00	85.20	18.10	18.10	49.20
Eagleswood,	...	...	......	....	7.00	3.50	3.50	....
Jackson,	5	2	10,145	5,190.00	242.30	110.55	110.55	21.20
Lacey,	1	16	35	25.00	47.75	8.01	7.99	31.75
Lakewood,	5	2	1,590	2,890.00	145.35	54.18	54.17	37.00
Little Egg Harbor,	...	...	......	....	....	....	....	....
Manchester,	6	13	6,965	13,365.00	326.45	115.33	180.12	31.00
Ocean,	1	...	12	10.00	6.00	....	....	6.00
Plumstead,	2	...	12,006	12,006.00	33.65	15.83	15.82	2.00
Stafford,	3	1	1,155	650.00	136.95	65.97	65.98	5.00
Union,	2	...	600	560.00	34.12	4.10	4.10	25.92
Total,	34	43	34,029	$36,955.00	$1,236.12	$455.57	$520.33	$260.42
Passaic County—								
Pompton,	32	10	2,178	$1,993.00	$382.40	$110.43	$110.42	$161.55
West Milford,	16	13	810	675.00	376.10	105.43	105.42	165.25
Total,	48	23	2,988	$2,668.00	$758.50	$215.86	$215.84	$326.80
Salem County—								
Alloway,	2	1	32	$75.00	$11.25	$1.50	$1.50	$8.25
Lower Alloways Creek,	...	...	......	....	....	....	....	....
Pittsgrove,	2	...	38	60.00	44.16	....	....	46.86
Quinton,	...	...	......	....	....	....	....	....
Upper Pittsgrove,	2	1	37	37.00	23.08	....	....	23.48
Total,	6	2	107	$172.00	$78.49	$1.50	$1.50	$78.59
Somerset County—								
Bernard,	9	8	148	$550.00	$363.90	$128.75	$128.75	$106.40
Bridgewater,	5	3	95	115.00	119.35	54.17	54.18	11.00
Hillsborough,	...	...	......	....	....	....	....	....
North Plainfield,	4	4	200	190.00	75.20	25.10	25.10	25.00
Warren,	2	1	25	25.00	24.20	10.60	10.60	5.00
Total,	20	16	468	$880.00	$582.65	$218.62	$218.63	$147.40
Sussex County—								
Andover,	1	1	18	$50.00	$13.00	$4.00	$4.00	$5.00
Byram,	5	8	250	240.00	93.40	10.75	10.75	71.90
Frankford,	1	...	30	30.00	....	....	....	....
Franklin (Boro),	...	...	......	....	....	....	....	....

Table IV—Forest Fires by Counties and Townships, 1917—Continued.

County and Township.	Number.		Acres Burned.	Loss to Forests and Other Property.	Cost to Extinguish.	Paid by.[†]		
	Forest Fires.	Embryo Fires.				Township.	State.	Offenders.
Sussex County—Con.								
Green,	1	...	10	25.00	21.00	10.50	10.50	...
Hampton,	1	...	5	20.00	5.00	2.50	2.50	...
Hardyston,	8	13	895	895.00	229.80	51.33	51.32	127.15
Hopatcong,	1	1	25	25.00	81.83	40.92	40.91	...
Montague,	3	...	275	160.00	38.30	19.15	19.15	...
Ogdensburg (Boro.),	...	4	...	2.00	13.00	1.50	1.50	10.00
Sandyston,	1	2	200	210.00	66.10	4.13	61.97	...
Sparta,	1	1	60	70.00	26.75	13.38	13.37	...
Stillwater,	1	1	25	25.00	23.20	11.60	11.60	5.00
Vernon,	4	2	365	345.00	74.45	26.22	26.23	22.00
Walpack,	1	1	70	70.00	27.35	...	...	27.35
Wantage,	3	...	90	85.00	39.45	19.73	19.72	...
Total,	32	34	2,318	$2,252.00	$752.63	$215.63	$273.52	$268.40
Union County—								
Mountainside,	1	1	40	$40.00	$19.50	$2.00	$2.00	$10.50
New Providence,	3	...	850	550.00	40.33	15.67	15.66	9.00
Scotch Plains,	3	...	408	555.00	56.50	28.25	28.25	...
Springfield,	...	...	...	...	...	...	...	...
Total,	7	1	1,298	$1,145.00	$116.33	$45.92	$45.91	$19.50
Warren County—								
Allamuchy,	1	1	8	$8.00	$32.60	$16.30	$16.30	...
Blairstown,	...	4	...	9.00	26.50	4.75	4.75	$17.00
Franklin,	2	...	40	10.00	27.10	13.55	13.55	...
Hardwick,	...	1	...	...	...	...	...	...
Harmony,	...	...	...	...	...	...	...	...
Hope,	...	...	...	...	...	...	...	...
Independence,	1	...	26	25.00	8.00	...	...	8.00
Knowlton,	1	13	50	98.00	74.75	2.50	2.50	69.75
Mansfield,	...	...	...	...	...	...	...	...
Pahaquarry,	1	1	60	60.00	49.10	7.00	7.00	35.10
Washington,	2	4	27	40.00	50.80	25.42	25.38	...
White,	...	...	...	...	...	...	...	...
Total,	8	24	211	$250.00	$267.85	$69.52	$69.48	$129.85
State Total,	504[*]	391[*]	92,479	$79,335.00	$11,465.90	$3,933.00	$4,103.22	$3,600.60

[*] These totals are greater than the actual number (871)) because in 23 cases one fire burned in two or more townships.

[†] The sum of these columns often differs from the "Cost to Extinguish" item because a fine was larger than the bill, or a bill was withdrawn, etc.

TABLE V.—VIOLATIONS OF THE FOREST FIRE LAW, 1917.

DATE.	COUNTY AND TOWNSHIP.	OFFENDER.	OFFENSE.	SETTLEMENT.
	Atlantic County—			
	Absecon,	Atlantic City R. R.,	1 fire set by locomotive,	Case dropped; township bill too tardy.
April 17, 1917,	Buena Vista,	Mrs. Freda Horn,	Set fire without a permit and allowed it to escape,	Paid fine, $2.00.
May 15,	Buena Vista,	Mike Barbailo,	Son set fire and allowed it to escape,	Paid fine, $5.00.
May 15,	Buena Vista,	Jos. Cavolia,	Set fire without a permit,	Pending.
October 18,	Buena Vista,	Andrew Alberici,	Set fire without a permit,	Pending.
	Buena Vista,	Atlantic City R. R.,	2 fires set by locomotives,	Paid firewarden's bills, $8.75.
	Buena Vista,	New Jersey Central R. R.,	5 fires set by locomotives,	Paid firewarden's bills, $53.80.
April 3,	Egg Harbor,	Louis Yancy,	Allowed brush fire to escape,	Dropped; offender fled jurisdiction.
	Egg Harbor,	Atlantic City R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $4.00.
April 16,	Egg Harbor City,	Mrs. Jacob Kimmock,	Set fire without a permit,	Released with a warning.
	Egg Harbor City,	Pennsylvania R. R.,	3 fires set by locomotives,	Cases dropped; township bills too tardy.
March 31,	Galloway,	W. H. Korte,	Set fire without a permit and allowed it to escape,	Paid fine, $6.83.
April 2,	Galloway,	Jesse Mathias,	Set fire without a permit and allowed it to escape,	Case dropped; insufficient evidence.
May 17,	Galloway,	Peter Kuyf,	Set fire without a permit and allowed it to escape,	Paid fine, $2.00.
May 18,	Galloway,	James McDevit,	Allowed brush fire to escape,	Pending.
	Galloway,	Atlantic City R. R.,	9 fires set by locomotives,	Paid firewarden's bills, $52.95.
	Galloway,	Pennsylvania R. R.,	16 fires set by locomotives,	Paid firewarden's bills, $81.77.
	Galloway,	Pennsylvania R. R.,	2 fires set by locomotives,	Cases dropped; township bills too tardy.
	Galloway,	Pennsylvania R. R.,	4 fires set by locomotives,	Pending.
April 12,	Hamilton,	John Locke,	Caused fire by dynamite blast,	Pending.
May 1,	Hamilton,	Mrs. B. E. Bennett,	Allowed brush fire to escape,	Released with warning.
May 17,	Hamilton,	J. Salerno,	Set fire without a permit and allowed it to escape,	Pending.
May 18,	Hamilton,	Mrs. Frank Eckhardt,	Set illegal back fire,	Pending.
October 31,	Hamilton,	Elder W. Robinson and party of three,	Set camp fire without a permit,	Pending.
January 4,	Hammonton,	E. H. Vare Co.,	Employee set fire without orders,	Employee discharged; case dropped.
April 16,	Hammonton,	Dominick Repie,	Set fire by careless smoking,	Dropped; insufficient evidence.

TABLE V.—VIOLATIONS OF THE FOREST FIRE LAW, 1917—Continued.

DATE.	COUNTY AND TOWNSHIP.	OFFENDER.	OFFENSE.	SETTLEMENT.
	Atlantic County—Con.			
May 14,	Hammonton,	H. S. Stapler,	Set fire without a permit and allowed it to escape,	Paid fine; $3.00.
	Hammonton,	Atlantic City R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $3.00.
	Hammonton,	Atlantic City R. R.,	1 fire set by locomotive,	Dropped; township bill too tardy.
	Hammonton,	Pennsylvania R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $6.00.
	Hammonton,	Pennsylvania R. R.,	1 fire set by locomotive,	Pending.
December 8, '16,	Mullica,	Otto C. Weber,	Allowed brush fire to escape,	Paid fine, $7.38.
March 31, '17,	Mullica,	Mrs. Martha Short,	Allowed brush fire to escape,	Pending.
May 11,	Mullica,	Henry A. Wood,	Set fire without a permit and allowed it to escape,	Paid fine, $5.00.
May 19,	Mullica,	Charles Weil,	Set fire without a permit,	Pending.
	Mullica,	Atlantic City R. R.,	2 fires set by locomotives,	Paid firewarden's bills, $7.00.
	Mullica,	Atlantic City R. R.,	2 fires set by locomotives,	Dropped; township bills too tardy.
	Mullica,	Pennsylvania R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $4.00.
	Mullica,	Pennsylvania R. R.,	2 fires set by locomotives,	Dropped; township bills too tardy.
	Weymouth,	Atlantic City R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $29.21.
	Bergen County—			
	Franklin,	New York, Susquehanna & Western R. R.,	1 fire set by locomotive,	Pending.
December 7, '16,	Hohokus,	Rockland Electric Co.,	Employee's carelessness caused fire,	Paid firewarden's bill, $2.00.
April 18, '17,	Hohokus,	Mrs. L. O. Winans,	Set fire without a permit and allowed it to escape,	Paid fine, $7.00.
	Montvale,	Erie R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $5.00.
	Montvale,	Erie R. R.,	2 fires set by locomotives,	Pending.
April 11,	Oakland,	Nick Roose,	Set fire by careless smoking,	Arrested, prosecuted, convicted, and paid fine of $25.00.
	Oakland,	New York, Susquehanna & Western R. R.,	11 fires set by locomotives,	Dropped; township bills too tardy.
	Burlington County—			
November 1, '16,	Bass River,	Leo Lamson and 4 others,	Set camp fire without a permit,	Paid fine, $10.00.
May 11, '17,	Bass River,	Norris Cramer,	Children at play set fire,	Released with a warning.
October 31,	Bass River,	C. J. Dickenson and party,	Set camp fire without a permit,	Pending.
December 15, '16	Evesham,	Wm. P. Seal, Jr.,	Set fire without a permit,	Released with a warning.
April 3, '17,	Pemberton,	Paslo Cioci,	Set fire by careless smoking,	Pending.
May 11,	Pemberton,	Miss May Hannis,	Set fire without a permit,	Paid fine, $10.50.
April 3,	Tabernacle,	Charles Bebee, Sr.,	Set fire by careless smoking,	Paid fine, $10.00.
	Tabernacle,	New Jersey Central R. R.,	1 fire set by locomotive,	Dropped; township bill too tardy.

TABLE V.—VIOLATIONS OF THE FOREST FIRE LAW, 1917—Continued.

DATE.	COUNTY AND TOWNSHIP.	OFFENDER.	OFFENSE.	SETTLEMENT.
	Burlington County—Con.			
December 6, '16,	Woodland,	Geo. W. Leach,	Sawmill engine sparks set fire,	Paid firewarden's bill, $2.20.
December 6,	Woodland,	Harry Leek,	Set fire without a permit and allowed it to escape,	Paid fine, $13.30.
May 17, '17,	Woodland,	Enterprise White Clay Co.,	1 fire set by locomotive,	Pending.
	Woodland,	New Jersey Central R. R.,	2 fires set by locomotives,	Dropped; township bill too tardy.
	Camden County—			
April 4,	Berlin,	Ezra Quam,	Allowed brush fire to escape,	Dropped; insufficient evidence.
	Berlin,	Pennsylvania R. R.,	1 fire set by locomotive,	Pending.
	Clementon,	Atlantic City R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $5.00.
	Clementon,	Pennsylvania R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $9.00.
March 31,	Chesilhurst,	Mrs. W. Montgomery,	Set fire without a permit,	Pending.
	Chesilhurst,	Pennsylvania R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $1.75.
March 26,	Waterford,	James Clark,	Set fire by careless smoking,	Paid fine, $7.00.
March 29,	Waterford,	Mrs. Mary List,	Set fire without a permit and allowed it to escape,	Released with warning.
March 29,	Waterford,	Phillip Vacek,	Refused to fight forest fire,	Released with warning.
March 31,	Waterford,	Mrs. S. Balson,	Set fire without a permit,	Paid fine, $5.00.
	Waterford,	Pennsylvania R. R.,	2 fires set by locomotives,	Dropped; township bills too tardy.
May 2,	Winslow,	John Capoferri,	Set fire without a permit and allowed it to escape,	Pending.
May 18,	Winslow,	Alvin Adams,	Set fire without a permit and allowed it to escape,	Paid fine, $10.25.
May 19.	Winslow,	Frank Ginter,	Set fire without a permit and allowed it to escape,	Paid fine, $5.50.
	Winslow,	Atlantic City R. R.,	12 fires set by locomotives,	Paid firewarden's bills, $116.50.
	Winslow,	Atlantic City R. R.,	4 fires set by locomotives,	Dropped; township bills too tardy.
	Winslow,	Atlantic City R. R.,	3 fires set by locomotives,	Pending.
	Winslow,	New Jersey Central R. R.	4 fires set by locomotives,	Paid firewarden's bills, $36.80.
	Winslow,	Pennsylvania R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $7.00.
	Winslow,	Pennsylvania R. R.,	2 fires set by locomotives,	Pending.
	ape May County—			
April 4,	Lower,	Cold Spring Granger, No. 132,	Set fire without a permit and allowed it to escape,	Pending.
	Lower,	Atlantic City R. R.,	2 fires set by locomotives,	Paid firewarden's bills, $14.00.
March 17,	Middle,	William Edwards,	Saw mill engine sparks set fire,	Released with warning.

TABLE V.—VIOLATIONS OF THE FOREST FIRE LAW, 1917—Continued.

DATE.	COUNTY AND TOWNSHIP.	OFFENDER.	OFFENSE.	SETTLEMENT.
	Cape May County—Con.			
	Middle,	Atlantic City R. R.,	4 fires set by locomotives,	Paid firewarden's bills, $54.25.
	Middle,	Atlantic City R. R.,	2 fires set by locomotives,	Pending.
	Middle,	Pennsylvania R. R.,	1 fire set by locomotive,	Dropped; township bill too tardy.
March 20,	Upper,	Thomas Leach,	Set fire without a permit and allowed it to escape,	Paid fine, $8.00.
April 23,	Upper,	Thomas Leach,	Allowed brush fire to escape,	Paid fine, $8.00.
	Upper,	Atlantic City R. R.,	2 fires set by locomotives,	Dropped; township bills too tardy.
	Cumberland County—			
	Commercial,	New Jersey Central R. R.,	1 fire set by locomotive,	Pending.
November 9, '16,	Deerfield,	Wm. Meehan,	Set fire without a permit and allowed it to escape,	Dropped; insufficient evidence.
December 7,	Deerfield,	Maurice Novalinsky,	Allowed brush fire to escape,	Pending.
December 7,	Deerfield,	A. C. Peelrich,	Set fire without a permit,	Released with warning.
December 7,	Deerfield,	Vincenzo Lopi,	Set fire without a permit and allowed it to escape,	Pending.
April 16, '17,	Deerfield,	Lewis Silver,	Set fire without a permit,	Paid fine, $5.00.
April 16,	Deerfield,	Max Zeffin,	Set fire without a permit,	Paid fine, $5.00.
April 22,	Deerfield,	Jos. Lamonte,	Child at play set fire,	Dropped; insufficient evidence.
May 17,	Deerfield,	J. Lombardo,	Set fire without a permit,	Paid fine, $5.00.
	Deerfield,	New Jersey Central R. R.,	1 fire set by locomotive,	Pending.
	Deerfield,	New Jersey Central R. R.,	1 fire set by locomotive,	Dropped; township bill too tardy.
April 17,	Fairfield,	Oliver Nichols,	Set fire without a permit and allowed it to escape,	Paid fine, $15.00.
March 23,	Landis,	Chas. Capara,	Set fire without a permit and allowed it to escape,	Pending.
March 26,	Landis,	Mrs. G. Viviani,	Set fire without a permit and allowed it to escape,	Paid fine, $10.00.
March 31,	Landis,	J. D. Romava,	Set fire without a permit,	Pending.
April 8,	Landis,	W. F. Conkling,	Set fire without a permit and allowed it to escape,	Pending.
April 23,	Landis,	Chris. Ketzel,	Set fire without a permit and allowed it to escape,	Paid fine, $6.00.
May 12,	Landis,	G. G. Bova,	Set fire without a permit,	Paid fine, $50.00.
May 15,	Landis,	Vincenzo Trovarile,	Set fire without a permit,	Pending.
May 16,	Landis,	Herbert Bellinger,	Set fire without a permit,	Released with warning.
May 16,	Landis,	Mike Curto,	Set fire without a permit,	Paid fine, $5.00.
May 17,	Landis,	Mrs. Joseph Reed,	Set fire without a permit,	Paid fine, $5.00.

TABLE V.—VIOLATIONS OF THE FOREST FIRE LAW, 1917—Continued.

DATE.	COUNTY AND TOWNSHIP.	OFFENDER.	OFFENSE.	SETTLEMENT.
	Cumberland County—Con.			
May 18,	Landis,	Mrs. Hettie Wilson,	Set fire without a permit and allowed it to escape,	Released with warning.
	Landis,	New Jersey Central R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $5.00.
	Landis,	Pennsylvania R. R.,	2 fires set by locomotives,	Paid firewarden's bills, $12.00.
	Landis,	Pennsylvania R. R.,	1 fire set by locomotive,	Pending.
	Laurence,	New Jersey Central R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $8.00.
April 4,	Maurice River,	Mrs. Barbara Gremon,	Set fire without a permit and allowed it to escape,	Released with a warning.
	Maurice River,	Pennsylvania R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $3.00.
	Maurice River,	Pennsylvania R. R.,	1 fire set by locomotive,	Pending.
November 3, '16,	Millville,	Millville School Children,	Children at play set fire,	Warned through teachers.
March 22, '17,	Millville,	L. F. Richards,	Set fire without a permit,	Paid fine, $5.00.
March 30,	Millville,	Hymen April,	Set fire without a permit and allowed it to escape,	Pending.
April 24,	Millville,	Nelson Creamer,	Set fire without a permit,	Pending.
May 15,	Millville,	Nick Berger,	Son at play set fire,	Released with warning.
May 19,	Millville,	John Dytko,	Sons at play set fire,	Paid fine, $2.00.
May 24,	Millville,	Pettinos Bros.,	Steam shovel set fire,	Paid firewarden's bill, $4.00.
	Millville,	Pennsylvania R. R.,	3 fires set by locomotives,	Paid firewarden's bills, $11.00.
	Millville,	Pennsylvania R. R.,	1 fire set by locomotive,	Pending.
	Gloucester County—			
December 8,	Elk,	Felix Forggio,	Set fire without a permit,	Paid fine, $5.00.
December 8,	Elk,	Robt. Roberts,	Set fire without a permit,	Paid fine, $5.00.
	Elk,	Pennsylvania R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $4.50.
	Elk,	Pennsylvania R. R.,	1 fire set by locomotive,	Pending.
April 2, '17,	Franklin,	Giacamo Comparri,	Set fire without a permit,	Paid fine, $5.00.
April 23,	Franklin,	Mrs. Weiner,	Set fire without a permit and allowed it to escape,	Pending.
April 30,	Franklin,	Mrs. G. Hudson McKuen,	Set fire without a permit,	Released with warning.
May 14,	Franklin,	Dominick Nigro,	Set fire without a permit and allowed it to escape,	Pending.
May 21,	Franklin,	Leander Boseman,	Allowed brush fire to escape,	Pending.
June 4,	Franklin,	A. B. McCarty,	Set fire without a permit,	Released with warning.
	Franklin,	Pennsylvania R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $8.40.
November 6, '16,	Monroe,	Mrs. Pete Krasouski,	Set fire without a permit,	Released with warning.
December 7,	Monroe,	Mrs. John Bonjosky,	Set fire without a permit and allowed it to escape,	Pending.
December 8,	Monroe,	Mrs. Bertha Bleas,	Set fire without a permit,	Paid fine, $2.50.

TABLE V.—VIOLATIONS OF THE FOREST FIRE LAW, 1917—Continued.

DATE.	COUNTY AND TOWNSHIP.	OFFENDER.	OFFENSE.	SETTLEMENT.
	Gloucester County—Con.			
December 8,	Monroe,	John Schmitt,	Set fire without a permit,	Paid fine, $2.00.
December 23,	Monroe,	J. Leepin,	Set fire without a permit,	Pending.
January 22, '17,	Monroe,	Vincent Riddle,	Set fire without a permit,	Paid fine, $5 00.
January 23,	Monroe,	Charles Errig, Jr.,	Set fire without a permit,	Paid fine, $5.00.
May 11,	Monroe,	Alexander Sokolesky,	Set fire without a permit,	Released with warning.
	Monroe,	Atlantic City R. R.,	3 fires set by locomotives,	Dropped; township bill too tardy.
May 11,	Washington,	Geo. Brewer,	Sawmill engine sparks set fire,	Paid firewarden's bill, $16.70.
	Hunterdon County—			
	Lebanon,	New Jersey Central R. R.,	1 fire set by locomotive,	Dropped; township bill too tardy.
	Mercer County—			
October 9,	Princeton,	Louis Trevilo and Daniel Depoldi,	Set fire without a permit,	Pending.
	Middlesex County—			
April 28,	East Brunswick,	John Oftin,	Set fire without a permit and allowed it to escape,	Pending.
April 29,	Madison,	Ernst Ganzloff,	Allowed a brush fire to escape,	Paid fine, $24.80.
September 29,	Madison,	J. B. Davison,	Set fire without a permit,	Released with warning.
September 29,	Madison,	F. D. Suydam,	Set fire without a permit,	Released with warning.
	Madison,	Pennsylvania R. R.,	1 fire set by locomotive,	Pending.
	Sayreville,	Pennsylvania R. R.,	2 fires set by locomotives,	Dropped; township bills too tardy.
	South Brunswick,	Pennsylvania R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $2.00.
	Monmouth County—			
	Atlantic,	New Jersey Central R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $3.00.
March 20,	Howell,	Jos. Reuter,	Set fire without a permit and allowed it to escape,	Paid fine, $15.00.
April 3,	Howell,	Bennett Gravel Co.,	Fire set by locomotive,	Paid firewarden's bill, $4.75.
April 4,	Howell,	Bennett Gravel Co.,	Fire set by locomotive,	Paid firewarden's bill, $5.75.
April 14,	Howell,	M. W. Lawson,	Set fire without a permit,	Released with warning.
September 29,	Howell,	Harry Rabinowitz,	Set fire without a permit,	Pending.
	Howell,	New Jersey Central R. R.,	24 fires set by locomotives,	Paid firewarden's bill, $180.75.
	Howell,	Pennsylvania R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $9.45.
March 31,	Shrewsbury,	Mrs. Lillian Reevey,	Set fire without a permit and allowed it to escape,	Pending.

TABLE V.—VIOLATIONS OF THE FOREST FIRE LAW, 1917—Continued.

DATE.	COUNTY AND TOWNSHIP.	OFFENDER.	OFFENSE.	SETTLEMENT.
	Monmouth County—Con.			
November 29, '16,	Wall,	Monmouth Contracting Co.,	Road tractor set fire,	Paid firewarden's bill, $8.50.
April 7, '17,	Wall,	Bennett Gravel Co.,	Fire set by locomotive,	Paid firewarden's bill, $7.90.
	Wall,	New Jersey Central R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $6.37.
	Wall,	Pennsylvania R. R.,	1 fire set by locomotive,	Dropped; township bill too tardy.
	Morris County—			
Nov. 21, '16,	Boonton,	H. A. Griffith,	Set fire without a permit,	Paid fine, $5.00.
March 31, '17,	Boonton,	H. A. Griffith,	Allowed brush fire to escape,	Paid fine, $10.00.
	Chester,	D., L. & W. R. R.,	3 fires set by locomotives,	Paid firewarden's bills, $13.00.
	Denville,	D., L. & W. R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $17.80.
April 3,	Hanover,	Mrs John Blanken,	Set fire without a permit and allowed it to escape,	Released with warning.
April 25,	Hanover,	H. B. Sproul Construction Co.,	Steam roller set fire,	Dropped; Morris Co. freeholders refused cooperation.
June 8,	Hanover,	John Healey,	Set fire by careless smoking,	Pending.
	Hanover,	D., L. & W. R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $7.00.
	Hancver,	D., L. & W. R. R.,	2 fires set by locomotives,	Pending.
	Hanover,	Morristown & Erie R. R.,	1 fire set by locomotive,	Pending.
March 30,	Montville,	Geo. Lister,	Set fire without a permit and allowed it to escape,	Dropped; fled jurisdiction.
	Montville,	D., L. & W. R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $22.00.
Nov. 2, '16,	Morris,	Mrs. Gordon MacDonald,	Set fire without a permit,	Paid fine, $2.00.
April 3, '17,	Morris,	Miss J. F. Sherman,	Set fire without a permit,	Released with warning.
April 16,	Morris,	Harry Anson,	Set fire by careless smoking,	Paid fine, $11.00.
April 21,	Morris,	J. H. B. Conrill,	Allowed a brush fire to escape,	Paid fine, $13.00.
April 17,	Mt. Olive,	Edward Jonus and Leonard Ringenback,	Set fire without a permit and allowed it to escape,	Pending.
June 29,	Mt. Olive,	Mrs. J. Schreiber,	Set fire without a permit,	Released with warning.
October 21,	Pequannock,	J. H. Bower,	Set fire without a permit,	Released with warning.
October 21,	Pequannock,	Wm. Dorerty,	Set fire without a permit,	Pending.
	Pequannock,	Erie R. R.,	1 fire set by locomotive,	Pending.
	Pequannock,	New York, Susquehanna & Western R. R.,	4 fires set by locomotives,	Pending.
May 8,	Randolph,	Robert Dalrymple,	Set fire without a permit,	Paid fine, $5.00.
May 11,	Randolph,	Joseph Naylor,	Sawmill engine sparks set fire,	Paid fine, $19.00.
	Randolph,	New Jersey Central R. R.,	3 fires set by locomotives,	Paid firewarden's bill, $123.80.
April 17,	Rockaway,	John Goddard,	Set fire without a permit,	Pending.
	Rockaway,	Mt. Hope Mineral R. R.,	3 fires set by locomotives,	Paid firewarden's bills, $24.00.

TABLE V.—VIOLATIONS OF THE FOREST FIRE LAW, 1917—Continued.

DATE.	COUNTY AND TOWNSHIP.	OFFENDER.	OFFENSE.	SETTLEMENT.
	Morris County—Con.			
	Rockaway,	New York, Susquehanna & Western R. R.,	3 fires set by locomotives,	Dropped; township bills too tardy.
May 15,	Rockaway,	D., L. & W. R. R.,	2 fires set by locomotives,	Pending.
April 29	Washington,	S. B. Vogel,	Set fire without a permit and allowed it to escape,	Released with warning.
May 15,	Washington,	Thomas Garden,	Allowed brush fire to escape,	Pending.
	Washington,	New Jersey Central R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $3.00.
	Ocean County—			
May 18,	Berkeley,	Mrs. Frank Perry,	Set fire without a permit,	Released with warning.
	Berkeley,	New Jersey Central R. R.,	4 fires set by locomotives,	Paid firewarden's bill, $15.85.
	Berkeley,	Pennsylvania R. R.,	2 fires set by locomotives,	Dropped; township bills too tardy.
May 14,	Brick,	Frank and Walter Durand,	Set fire without a permit and allowed it to escape,	Paid fine, $29.50.
	Dover,	New Jersey Central R. R.,	2 fires set by locomotives,	Paid firewarden's bills, $49.20.
May 15,	Jackson,	Frank Veltre,	Set fire without a permit and allowed it to escape,	Pending.
April 3,	Lacey,	Cedar Crest Orchard and Produce Co.,	Allowed brush fire to escape,	Paid firewarden's bill, $47.00.
	Lacey,	New Jersey Central R. R.,	11 fires set by locomotives,	Paid firewarden's bills, $30.50.
	Lacey,	New Jersey Central R. R.,	1 fire set by locomotive,	Pending.
	Lacey,	New Jersey Central R. R.,	2 fires set by locomotives,	Dropped; township bill too tardy.
	Lakewood,	New Jersey Central R. R.,	3 fires set by locomotives,	Paid firewarden's bills, $37.00.
	Manchester,	New Jersey Central R. R.,	6 fires set by locomotives,	Paid firewarden's bills, $39.00.
	Manchester,	New Jersey Central R. R.,	2 fires set by locomotives,	Dropped; township bills too tardy.
	Manchester,	Pennsylvania R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $1.00.
June 5,	Ocean,	Louis Borsum,	Allowed brush fire to escape,	Pending.
May 26,	Plumstead,	Peter Howyesk,	Set fire without a permit,	Released with warning.
August 31,	Plumstead,	Harry Hopkins,	Set fire without a permit,	Pending.
May 15,	Stafford,	D. J. Heck,	Set fire without a permit and allowed it to escape,	Paid fine, $5.00.
June 26,	Stafford,	Anthony Abrardi,	Set fire without a permit and allowed it to escape,	Pending.
	Union,	New Jersey Central R. R.,	1 fire set by locomotive,	Pending.

TABLE V.—VIOLATIONS OF THE FOREST FIRE LAW, 1917—Continued.

DATE.	COUNTY AND TOWNSHIP.	OFFENDER.	OFFENSE.	SETTLEMENT.
	Passaic County—			
April 13,	Pompton,	Wm. Clark,	Allowed brush fire to escape,	Paid fine, $2.00.
August 27,	Pompton,	Arthur Conklin,	Set camp fire without a permit,	Released with warning.
September 14,	Pompton,	Mrs. Thos. Gormley,	Set fire without a permit,	Released with warning.
September 30,	Pompton,	F. H. Kneeland,	Set camp fire without a permit,	Released with warning.
October 7,	Pompton,	John Joyce,	Set camp fire without a permit,	Released with warning.
October 7,	Pompton,	G. Maennle,	Set camp fire without a permit,	Released with warning.
October 19,	Pompton,	Mrs. O'Conner,	Set fire without a permit,	Pending.
	Pompton,	Erie R. R.,	3 fires set by locomotives,	Paid firewarden's bills, $55.25.
	Pompton,	Erie R. R.,	12 fires set by locomotives,	Pending.
	Pompton,	Erie R. R.,	2 fires set by locomotives,	Dropped; township bills too tardy.
	Pompton,	New York, Susquehanna & Western R. R.,	1 fire set by locomotive,	Pending.
May 11,	West Milford,	F. Schulster,	Set fire without a permit,	Paid fine, $2.00.
September 3,	West Milford,	D. Poldernaus and party,	Set camp fire without a permit,	Pending.
September 16,	West Milford,	A. Anderson,	Set camp fire without a permit,	Pending.
September 30,	West Milford,	Hugo Fried,	Set fire without a permit,	Pending.
	West Milford,	Erie R. R.,	2 fires set by locomotives,	Paid fire warden's bills, $40.25.
	West Milford,	Erie R. R.,	1 fire set by locomotive,	Dropped; township bill too tardy.
	West Milford,	New York, Susquehanna & Western R. R.,	2 fires set by locomotives,	Paid firewarden's bills, $24.00.
	West Milford,	New York, Susquehanna & Western R. R.,	11 fires set by locomotives,	Pending.
	Salem County—			
	Alloway,	Pennsylvania R. R.,	2 fires set by locomotives,	Paid firewarden's bills, $8.25.
April 28,	Pittsgrove,	Manuel Mokasian,	Set fire without a permit and allowed it to escape,	Pending.
	Pittsgrove and Upper Pittsgrove,	Pennsylvania R. R.,	1 fire set by locomotive,	Pending.
Nov. 9, '16,	Upper Pittsgrove,	C. B. Wilson,	Allowed a brush fire to escape,	Paid fine, $7.00.
May 19, '17,	Upper Pittsgrove,	Walter Nelson,	Set fire without a permit and allowed it to escape,	Paid fine, $5.00.
	Somerset County—			
March 29,	Bernards,	John Burnbal,	Set fire without a permit and allowed it to escape,	Released with warning.
April 1,	Bernards,	A. Friedlander,	Set fire without a permit,	Released with warning.
April 14,	Bernards,	Geo. Zarhardt,	Allowed brush fire to escape,	Released with warning.

TABLE V.—VIOLATIONS OF THE FOREST FIRE LAW, 1917—Continued.

DATE.	COUNTY AND TOWNSHIP.	OFFENDER.	OFFENSE.	SETTLEMENT.
	Somerset County—Con.			
April 16,	Bernards,	New York Telephone Co.,	Employees set fire without a permit and allowed it to escape,	Paid firewarden's bill, $27.00.
	Bernards,	D., L. & W. R. R.,	3 fires set by locomotives,	Paid firewarden's bills, 79.40.
	Bernards,	D., L. & W. R. R.,	1 fire set by locomotive,	Dropped; township bill too tardy.
April 3,	Bridgewater,	Patsy Tullo,	Set fire without a permit and allowed it to escape,	Released with warning.
April 17,	Bridgewater,	Thomas Holmes,	Set fire by careless smoking,	Offender fled jurisdiction.
April 17,	Bridgewater,	Morris Levin,	Set fire without a permit,	Released with warning.
May 14,	Bridgewater,	Augustus C. Thomas,	Set fire without a permit and allowed it to escape,	Paid fine, $11.00.
April 3,	North Plainfield,	Allen Cowperthwaite,	Employee set fire without a permit and allowed it to escape,	Paid fine, $13.00.
May 19,	North Plainfield,	John J. Bolard,	Set camp fire without a permit and allowed it to escape,	Two of the offenders paid fines of $6.00 each; third one fled jurisdiction.
	North Plainfield,	John F. Wilcox,		
	North Plainfield,	Julius Breyer,		
May 17,	Warren,	Leonard Mack,	Set fire without a permit and allowed it to escape,	Paid fine, $5.00.
	Sussex County—			
	Andover,	D., L. & W. R. R.,	1 fire set by locomotive,	Dropped; township bill too tardy.
	Andover,	Lehigh & Hudson R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $5.00.
	Byram,	D., L. & W. R. R.,	11 fires set by locomotives,	Paid firewarden's bill, $71.80.
April 11,	Green,	Geo. Staley,	Allowed brush fire to escape,	Released with warning.
May 17,	Hampton,	D. Mutti,	Set fire without a permit,	Released with warning.
	Hardyston,	New York, Susquehanna & Western R. R.,	3 fires set by locomotives,	Paid firewarden's bills, $27.00.
	Hardyston,	New York, Susquehanna & Western R. R.,	10 fires set by locomotives,	Pending.
July 16,	Hopatcong,	Mrs. F. Graul,	Set fire without a permit,	Released with warning.
	Ogdensburg,	New York, Susquehanna & Western R. R.,	3 fires set by locomotives,	Pending.
	Ogdensburg,	New York, Susquehanna & Western R. R.,	1 fire set by locomotive,	Dropped; township bill too tardy.
May 16,	Stillwater,	W. Marchieso,	Set fire without a permit,	Paid fine, $5.00.
May 19,	Vernon,	Jesse Crain,	Allowed brush fire to escape,	Pending.

TABLE V.—VIOLATIONS OF THE FOREST FIRE LAW, 1917—Continued.

DATE.	COUNTY AND TOWNSHIP.	OFFENDER.	OFFENSE.	SETTLEMENT.
	Sussex County—Con.			
April 16,	Wallpack,	Irving Kishpaugh,	Set fire by careless smoking,	Pending.
May 14,	Wallpack,	New York Telephone Co.,	Employees set fire without a permit and allowed it to escape,	Paid fine, $59.45.
	Wantage,	New York, Susquehanna & Western R. R.,	1 fire set by locomotive,	Dropped; township bill too tardy.
	Union County—			
March 31,	Mountainside,	W. Pryor,	Set illegal back fire and allowed it to escape,	Paid fine, $10.50.
	New Providence,	D., L. & W. R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $9.00.
February 12,	Scotch Plains,	Walter Van Riper,	Set fire without a permit,	Released with warning.
	Warren County—			
	Blairstown,	D., L. & W. R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $17.00.
	Blairstown,	D., L. & W. R. R.,	1 fire set by locomotive,	Dropped; township bill too tardy.
	Independence,	Lehigh & Hudson R. R.,	1 fire set by locomotive,	Paid firewarden's bill, $8.00.
	Knowlton,	D., L. & W. R. R.,	5 fires set by locomotives,	Paid firewarden's bills, $35.50.
	Knowlton,	Lehigh & New England R. R.,	6 fires set by locomotives,	Paid firewarden's bills, $26.25.
	Knowlton,	New York, Susquehanna & Western R. R.,	2 fires set by locomotives,	Paid firewarden's bills, $4.00.
	Knowlton,	New York, Susquehanna & Western R. R.,	1 fire set by locomotive,	Pending.
	Washington,	D., L. & W. R. R.,	3 fires set by locomotives,	Dropped; township bills too tardy.

APPENDIX

MINERAL PRODUCTION IN NEW JERSEY DURING 1916.[1]

The Department of Conservation and Development, as the successor of the Geological Survey of New Jersey, has continued the cooperative work with the United States Geological Survey in the collection of mineral statistics. The following brief summary of the mineral production in New Jersey during 1916 is the result of this cooperative work.

While New Jersey may not rank among the great mining states, it does make a very creditable showing among the smaller states, ranking especially high as a producer of zinc ores and of clay and clay-products.

Total production.—The total value of the mineral production of New Jersey during 1916 was $40,399,540. This was an increase of more than $7,000,000 over the output for 1915 and was only equalled in the past in 1913. The chief increase was in clay and clay-products; there were also large increases in Portland cement and iron ore.

Zinc ore.—The mining of zinc ore continues to be one of the chief mineral industries, making New Jersey rank next to Missouri, the greatest of the zinc-producing states. The large production of 1915 was exceeded in 1916, the demand for spelter under war conditions being very large. The quantity of ore taken from the mine during 1916 was 736,830 short tons, of which all but about 12,000 tons was from the great Franklin Furnace mine of the New Jersey Zinc Company, probably the largest zinc mine in the world, the balance coming from the recently reopened Sterling Hill mine near Ogdensburg, owned by the same company. The total amount of zinc ore which has been taken from the mines in New Jersey since 1880 is 8,184,023 short tons.

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[1] **Compiled by M. W. Twitchell, Assistant State Geologist.**

Iron ore.—For many years the magnetite ore of New Jersey has been valued highly in the manufacture of certain types of steel. Six iron mines were in active operation during 1916, the total quantity of ore mined being 493,004 long tons, an increase of 77,770 tons. The amount marketed was 528,084 long tons, having a value of $1,877,056, an increase in quantity of 136,969 tons and in value of $736,656. The influence of the present great war is evident in the fact that this was the largest quantity mined since 1909 and both the total value and average value per ton ($3.55) were the greatest in over 10 years. The total amount of iron ore which has been mined in the State since 1870 is 21,398,645 long tons.

Clay and clay-products.—The greatest single mineral industry is the production of raw clay, in which New Jersey has for years led the states, and clay-products, in which it usually alternates with Ohio in first or second place. Ohio leads in the making of china and white ware, while New Jersey leads in the manufacture of sanitary ware. For New Jersey, the year 1916 was a very prosperous one in this great industry, there being a marked recovery from the depression reported in 1915. The total value of both clay and clay-products in New Jersey in 1916 was $21,605,198, an increase of $5,021,876 over that of the previous year, the increase being chiefly due to the record-breaking production of pottery. As in previous years, Middlesex County was far in the lead in the production of raw clay and brick and tile, while Mercer County was much the greatest producer of pottery, chiefly sanitary ware and porcelain electrical supplies.

Portland cement.—The cement district of New Jersey is the eastward extension of the famous Lehigh District of Pennsylvania. The three producing companies are the Alpha, the Vulcanite, and the Edison, all located comparatively near Phillipsburg. The total production for 1916 was 2,609,617 barrels, an increase of 1,030,444 barrels over that of 1915, tho not as great as the record output of 1913. The shipments were 2,592,302 barrels valued at $2,534,623, an increase in quantity of 614,828 barrels and in value of $1,061,124 over the previous year.

Stone.—Two striking features have characterized the stone industry of New Jersey during recent years, one being the gradual decrease in the output of practically all other forms of stone than trap rock, the other, the steady increase in the production of crushed trap rock for road metal, railroad ballast, and concrete. New Jersey ranks second among the states in the production of trap rock (basalt and diabase). The total output of stone in New Jersey during 1916 was valued at $1,666,299, an increase of $54,238 over that for 1915. This includes trap rock, limestone, granite, sandstone, slate, and talc-rock or serpentine. The quantity of trap rock was 1,496,560 tons valued at $1,293,217.

Sand and gravel.—New Jersey is an important producer of sand and gravel, the total output in 1916 being 3,936,020 short tons valued at $1,306,953, an increase of $69,916. A decrease in the gravel output due to a few large plants being idle makes this total misleading. When the sand alone is considered, a truer idea of the general gain is obtained, there having been an increase in the quantity of sand of 345,513 tons and in value of $306,784. The chief varieties of sand produced, in the order of importance, are building sand, molding sand, paving sand, and glass sand.

Other minerals.—Among the other mineral products of New Jersey are mineral water, lime, greensand marl, mineral paints, sand-lime brick, ground quartz, and coke and its by-products. In some of these industries there are several operators but the total value of the output is small; in others, tho the value of the production is relatively large, there are fewer than three operators and the figures have to be concealed in order to avoid revealing individual production. Such details as can be published will be found in the table following. The most important new development in connection with these minor minerals is that greensand marl is now being utilized as a source of potash salts. The total amount of greensand marl mined for this purpose is as yet not very large but it is likely to be increased in the near future.

Statistical table.—Details of the mineral production are given in the following table, which also presents figures for previous years for purposes of comparison.

Mineral production in New Jersey in 1916.

Product	No. of Producers	1916 Quantity	1916 Value	1915 Value	1914 Value
Zinc ore (a)		736,830 s. t.	(a)	(a)	(a)
Iron ore (b)	4	528,084 l. t.	$1,877,056	$1,140,400	$1,076,208
Clay—					
Ball clay	6	6,318 s. t.	26,397	27,879	13,341
Fire and sagger clay	37	264,033 "	585,230	412,353	485,599
Stoneware clay	7	8,288 "	22,388	28,706	25,532
Brick clay	4	22,074 "	17,880	35,808	24,229
Other grades	15	71,203 "	138,901	113,158	99,883
Total raw clay	43	371,916 s. t.	$790,796	$617,904	$648,584
Pottery—					
Sanitary ware	20		$6,458,356	$4,793,406	$5,058,204
Porcelain electrical supplies	13		1,674,093	1,028,992	905,878
China, bone china, delft, belleek	7		1,407,930	983,855	1,076,043
Whiteware, etc. (c)	8		811,391	665,633	727,637
Stoneware, etc. (d)	7		148,410	126,415	107,486
Miscellaneous (e)	11		564,698	451,037	256,108
Total pottery	54		$11,064,878	$8,049,338	$8,131,356
Brick (and tile)—					
Common brick	47	328,419 M	$2,366,614	$2,099,654	$1,944,806
Front brick Fancy brick Enameled brick	9		816,346	784,919	841,000
Fire brick	11	37,891 M	1,162,794	899,613	897,442
Total brick	60		$4,354,754	$3,784,186	$3,683,248
Drain tile	8		30,542	41.331	31,043
Architectural terra cotta	6		1,818,052	1,430,968	1,620,791
Fireproofing and hollow blocks	11		1,830,949	1,389,120	1,599,295
Tile (other than drain tile)	17		1,298,392	995,097	1,139,895
Miscellaneous (f)	11		425,835	275,378	279,024
Total tile, etc.	47		$5,403,770	$4,131,894	$4,670,048
Total clay and clay products	193		$21,605,198	$16,583,322	$5,021,876
Portland cement (g)	3	2,609,617 bbls.	$2,534,623	$1,473,499	$3,081,205
Stone—					
Trap	51	1,496,560 s. t.	1,293,217	1,281,545	1,164,529
Limestone (h)	10	327,418 "	245,019	159,549	240,937
Granite (i)	7		71,421	95,986	74,808
Sandstone (j) Slate Talc Serpentine	11		56,642	63,964 11,017	53,394 14,105
Total stone	79		$1,666,299	$1,612,061	$1,547,773
Total crushed stone	60	1,614,956 s. t.	$1,369,926	$1,380,266	$1,215,708

Mineral Production in New Jersey in 1916.—Con.

Product	No. of Producers	1916 Quantity	1916 Value	1915 Value	1914 Value
Sand—					
Building sand	36	1,950,858 s. t.	$417,954	$421,927	$394,092
Molding sand	35	644,611 "	479,426	331,792	237,788
Paving sand	6	204,104 "	83,146	53,559	39,902
Glass sand	7	139,934 "	115,204	64,862	62,595
Blast sand Grinding and polishing sand	5	71,708 "	86,599	48,236	23,207
Engine sand	5	68,603 "	23,318	20,133	21,849
Fire or furnace sand......	11	62,240 "	49,787	37,184	33,367
Filter sand	4	26,010 "	24,755	(1)	(1)
Other sands (m)........	10	32,992 "	26,764	22,476	59,089
Total sand	49	3,201,060 s. t.	$1,306,953	$1,000,169	$871,889
Gravel	33	734,960 s. t.	$210,450	$447,388	$672,433
Mineral water	12	7,110 s. t.	26,084	35,393	41,226
Lime	15	1,580,028 gal.	$130,993	$116,226	$155,649
Miscellaneous—					
Greensand marl Coke and by-products Mineral paints Sand-lime brick Ground quartz Zinc ore (a)	14		11,041,814	10,821,452	7,970,979
Total of all products..	402		$40,399,540	$33,364,117	$32,550,598

(a) As there is but one zinc operator, the value of the ore cannot be given separately, but is included in the total for miscellaneous minerals. The quantity given is the ore hoisted, or taken from the mine.
(b) The quantity of iron ore given is the ore marketed.
(c) Whiteware, C. C. ware, white granite, semi-porcelain ware, and semi-vitreous porcelain ware.
(d) Stoneware, yellow or Rockingham ware, and red earthenware.
(e) Includes chemical stoneware, tobacco pipes, hardware trimmings, art pottery, souvenirs, etc.
(f) Includes sewer pipe, stove lining, silica brick, conduits, gas logs, flue lining, wall coping, glass house supplies, etc.
(g) The quantity given is the number of barrels shipped.
(h) Includes limestone used for blast furnace flux and for agricultural purposes, as well as for road making, etc.
(i) Most of the granite was in the form of crushed stone for concrete and railroad ballast.
(j) Combined in order not to reveal the individual production of slate or of talc and serpentine in 1916.
(k) These values have been included in the different varieties of stone and in the total stone production.
(l) Included in "other sands" in 1914 and 1915.
(m) Includes sand for potteries, soap manufacturers, etc.

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